

Invasive Pest Plant Management

Prepared for
DEPARTMENT OF THE AIR FORCE
Arnold Air Force Base, Tennessee

January 2005

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Report Documentation Page

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Finding of No Significant Impact:

Arnold Air Force Base

Invasive Pest Plant Management at Arnold AFB, Tennessee

Arnold Air Force Base (Arnold AFB) has prepared an Environmental Assessment (EA) (January 2005) that evaluates the potential environmental and socioeconomic impacts associated with implementation of the Invasive Pest Plant (IPP) Management Plan. The Proposed Action would apply chemical, prescribed burning, and mechanical methodologies to control invasive pest plants.

Description of the Proposed Action

The objectives of the Proposed Action are to:

- Maintain the structure and function of ecologically significant plant communities.
- Restore a functioning mosaic of Barrens habitats.
- Protect high priority sites where plant invasions threaten rare species habitats.
- Develop monitoring protocols to track management effects and detect new IPP occurrences.

Achievement of these objectives would fulfill the goals of the Forest Management Plan and meet the overall objectives for natural resource management on Arnold AFB. There are numerous IPP species on Arnold AFB. Privet, mimosa, garlic mustard, and crown vetch are a few examples of species that can rapidly colonize an area, displacing more desirable species.

The EA examines the potential for impacts to the environment that would result from implementation of chemical and mechanical control methods across the landscape at Arnold AFB. Arnold AFB identifies target areas that require IPP control on a regular basis. The current plan addresses specific actions that would be implemented during fiscal years 2005 and 2006, including:

- Prescribed burning to reduce or eliminate IPP species that do not tolerate fire
- Mowing to prevent seed set and reduce reproduction
- Manual removal of plants through cutting or pulling
- Selective application of herbicides to foliage or cut surfaces

Impacts associated with the use of prescribed burning as a control measure are addressed in a separate EA.

No-Action Alternative

Under the No-Action Alternative, no IPP control would be implemented on Arnold AFB. IPP species would be able to persist and spread across the Base. Native vegetation and desirable species would be displaced by the spread of IPP species. Rare plant populations occurring on Arnold AFB would be threatened by increased competition

from the spread of IPPs. As a result, the No-Action Alternative does not meet the stated objectives.

Environmental Consequences

No significant negative environmental or socioeconomic consequences were identified in the EA for the proposed project. Use of chemical herbicides presents an occupational health risk to the individuals applying the materials. In addition, some herbicides or ignition sources for prescribed burns may be hazardous and present risks of exposure to hazardous materials. However, operations would be conducted according to prescribed procedures and the public would be protected from exposure to harmful conditions. Use of appropriate handling procedures and personal protective equipment would eliminate or minimize these potential risks to the individuals using the control techniques. Potential impacts to water quality or biological resources could result from chemical application and associated runoff or accidental spills. Project design features, including selective applications and appropriate best management practices, would eliminate or minimize these potential impacts. It was determined that the proposed project would benefit the environmental mission at Arnold AFB by enhancing native vegetation and reducing threats to rare plant species.

Conclusion

The attached EA was prepared pursuant to Air Force Instruction (AFI) 32-7061, 32 Code of Federal Regulations (CFR) 989, and U.S. Council on Environmental Quality (CEQ) regulations (Title 40, U.S. Code, Parts 1500-1508) for implementing the procedural requirements of the National Environmental Policy Act (NEPA). The finding of this EA is that the Proposed Action will have no significant impact on the human or natural environment. Notification was provided in local newspapers from 9-Feb-2005 through 11-Mar-2005 with no response from the public. Therefore, a Finding of No Significant Impact (FONSI) is issued for the Proposed Action and no Environmental Impact Statement (EIS) is required.

Restrictions

No restrictions are necessary for the Proposed Action.



Charles King
Chief, Environmental Management Division
Arnold AFB, TN

Date: 24 Mar 05

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Acronyms and Abbreviations

AEDC	Arnold Engineering Development Center
AF	Air Force
AFB	Air Force Base
AFI	Air Force Instruction
AICUZ	Air Installation Compatible Use Zone
BMP	Best Management Practice
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWA	Clean Water Act
DoD	Department of Defense
EA	Environmental Assessment
EHR	Eastern Highland Rim
EIAP	Environmental Impact Analysis Process
EO	Executive Order
ESA	Endangered Species Act
FY	Fiscal Year
FMP	Forest Management Plan
IEMP	Integrated Ecosystem Management Plan
IPP	Invasive Pest Plant
IPT	Integrated Process Team
IRP	Installation Restoration Program
MSDS	Material Safety Data Sheet
MU	Management Unit
NCGP	No Consumption-General Public
NEPA	National Environmental Policy Act

NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NPS	Non-point Source
PCBs	Polychlorinated Biphenyls
PPE	Personal Protective Equipment
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
RTE	Rare, Threatened, and Endangered
SARA	Superfund Amendments and Reauthorization Act
SMZ	Streamside Management Zone
SVOC	Semivolatile Organic Compound
SWMU	Solid Waste Management Unit
TDEC	Tennessee Department of Environment and Conservation
TSCA	Toxic Substance Control Act
TVA	Tennessee Valley Authority
TWQCA	Tennessee Water Quality Control Act
TWRA	Tennessee Wildlife Resources Agency
USACE	U.S. Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USC	U.S. Code
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service
UTSI	University of Tennessee Space Institute
WPC	Division of Water Pollution Control
WQA	Water Quality Act

Disclaimer

The use of trade names for products in this document is for clarity involving names of chemical compounds and does not constitute or imply endorsement of these products.

1.0 Purpose and Need for Action

1.1 Background

Arnold Air Force Base (AFB) is located in Coffee and Franklin Counties in Middle Tennessee. Arnold AFB is approximately 70 miles southeast of Nashville, the state capitol. Positioned near the towns of Manchester, Tullahoma, and Winchester, Arnold AFB is the largest employer in the two-county area (Figure 1-1).

Arnold AFB occupies 39,081 acres including the 3,632-acre Woods Reservoir, which contains approximately 26 billion gallons of water. Woods Reservoir is the source of drinking water for the Base and provides cooling water for facilities in the industrial area. On Arnold AFB, there are 5,647 acres of cultivated pine forests and 23,816 acres of hardwood forests. Grasslands and early-successional habitats in utility rights-of-way occupy 1,479 acres on the installation and provide habitat for numerous rare species (Call, 2003).

1.1.1 Operations

Arnold Engineering Development Center (AEDC), which is located on Arnold AFB, is the most advanced and largest complex of flight simulation test facilities in the world, with 53 aerodynamic and propulsion wind tunnels, rocket and turbine engine test cells, space environmental chambers, arc heaters, ballistic ranges, and other specialized units. Facilities can simulate flight conditions from sea level to altitudes of more than 100,000 feet (ft), and from subsonic velocities to those well over Mach 20. Twenty-seven of AEDC's test units have capabilities unmatched in the world. AEDC has contributed to the development of nearly every top national aerospace program since the 1950s. Customers include the U.S. Air Force (AF), the U.S. Army and U.S. Navy, the National Aeronautics and Space Administration, the Federal Aviation Administration, private industry, allied foreign governments, and U.S. government and educational institutions.

The Arnold AFB commander is responsible for accomplishing Base's mission. The commander's staff of military personnel and civil service employees is responsible for the overall planning, direction, scheduling, assignment, and funding associated with mission requirements. Under staff supervision, the management, operation, and maintenance of test facilities, real property, and related equipment and utilities are accomplished by contract.

1.1.2 History

Arnold AFB is named for the late Henry H. "Hap" Arnold. At the close of WW II, General Arnold, Commander of the Army Air Forces, asked Dr. Theodore von Karman, Chief Scientific Advisor to the AF and one of history's great aeronautical test scientists, to form a Scientific Advisory Group to chart a long-range research and development course for the future AF. Dr. von Karman sent a task force from his newly formed group to Germany to determine how the Germans had made such rapid progress in

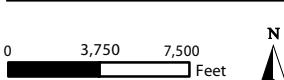
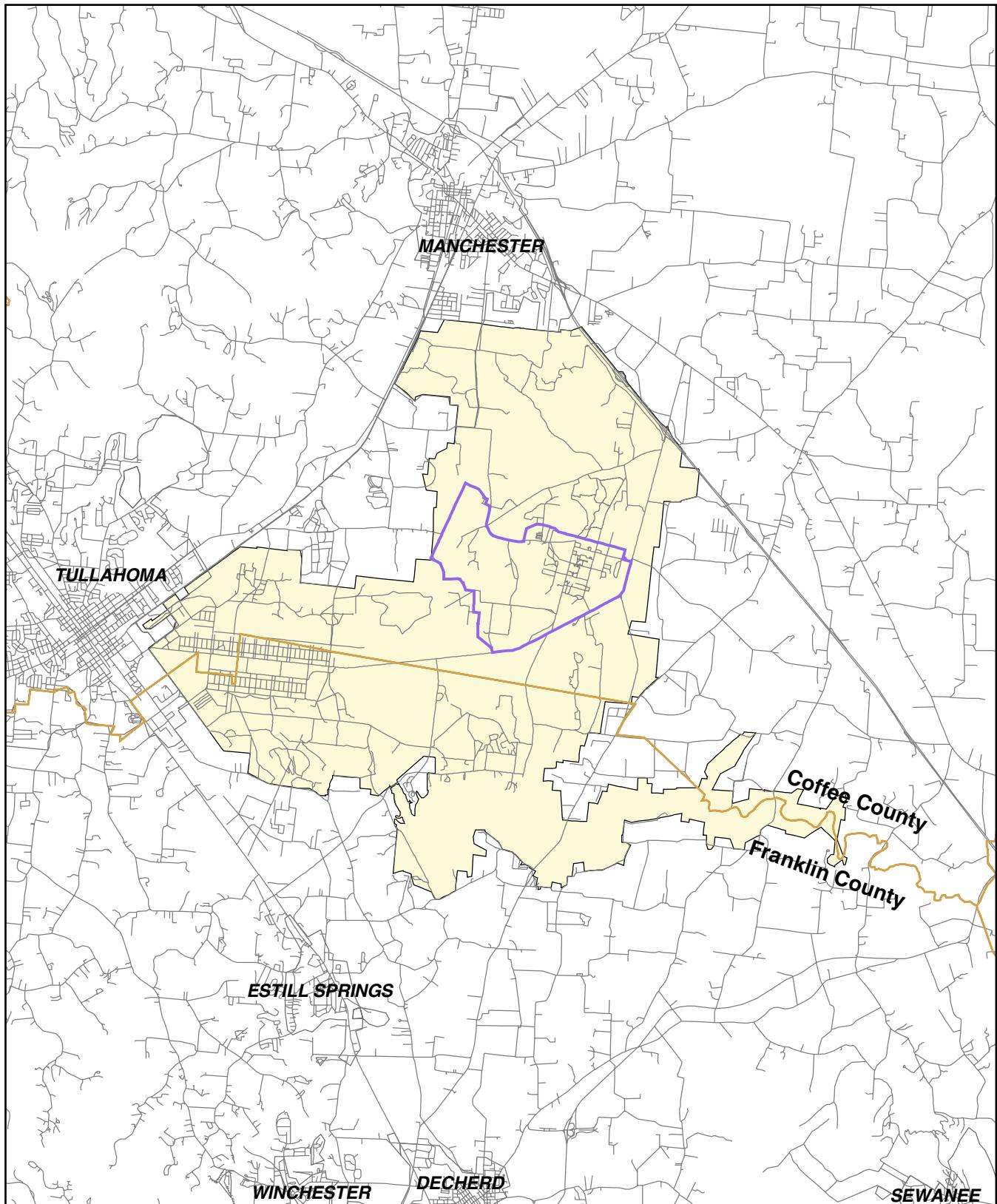


Figure 1-1
Arnold Air Force Base and General Vicinity
Invasive Pest Plant Management
Final Environmental Assessment



developing high-performance jet aircraft and rocket-powered missiles. One member of the task force, Dr. Frank Wattendorf, was responsible for surveying wind tunnels and ground test facilities. On his flight home, Dr. Wattendorf wrote a memo that proposed using captured German test facilities to establish a new engineering development center. The new center would consolidate the best civilian and military scientists as well as state-of-the-art test facilities to properly test and evaluate the weapon systems needed to guarantee the United States' superior airpower and thereby the national security. Dr. Wattendorf's "trans-Atlantic memo" became the blueprint for AEDC.

In 1949, Congress authorized \$100 million for the construction of AEDC. A site was selected for the new center at the Army's old Camp Forrest near Tullahoma, and construction began in June 1950. The site was chosen because of the availability of land, water, and power, and to buffer surrounding communities from expected test hazards and noise. Water was needed to cool the rapidly flowing air and hot exhaust gases, and electricity was required to power the huge motordrive systems. The large land acquisition was necessary to accommodate growth for future test facilities and its remote location provided the security required by the size of the installation.

On June 25, 1951, 1 year after General Arnold's death, President Harry S. Truman dedicated the AEDC and renamed it in honor of General Arnold. Anticipating the role this national facility would play in developing key weapon systems, President Truman said, "Never again will the United States ride the coattails of other countries in the progress and development of the aeronautical art. The genius that was General Arnold's is manifest in this installation which now bears his name."

1.1.3 Military Mission

The military mission is to support the development of aerospace systems by testing hardware in facilities that simulate flight conditions. The AEDC also conducts a research and technology program to develop advanced test techniques and instrumentation and to support the design of new test facilities. The official mission is:

To provide our customers with the world's most effective and affordable aerospace ground test and evaluation, and simulation products and services. To ensure AEDC ground test facilities, technologies, and knowledge fully support today's and tomorrow's customers.

Implicit within this mission is the need to anticipate and plan for growth of the test facilities at AEDC. Ecosystem management provides the framework for the careful assessment of environmental impacts, allowing for the planning and development of new facilities, while at the same time protecting the natural and cultural resources.

The implementation of ecosystem management at Arnold AFB is also in direct support of the overall Department of Defense (DoD) mission. The DoD mission requires that natural resources be managed to provide for the environmental security necessary to support the military mission of national defense. By conserving biodiversity, ecosystem management contributes to national security by helping maintain the natural resources upon which this country's strength depends. Ecosystem management also helps

maintain natural landscapes for military training. Combat readiness is founded on the ability of the armed forces to sustain realistic military training now and into the future.

1.2 Proposed Action

Management of the ecosystems present on Arnold AFB helps maintain diversity of the natural resources. Invasive pest plants (IPPs) pose a substantial threat to natural resources, primarily by invading native plant communities and changing their composition, structure, and function. IPPs typically are more vigorous than native species they displace and typically have fewer or no natural predators and diseases, which confers an additional competitive advantage. The Proposed Action is to implement the Invasive Pest Plant Management Plan, which would be designed to control and/or eliminate IPPs on Arnold AFB.

1.3 Need for Proposed Action

The control or removal of IPPs is a necessary component of ecosystem and forest management on Arnold AFB. The Site Conservation Planning process, as described in the Integrated Ecosystem Management Plan (IEMP) for Arnold AFB (Call, 2003) has identified four conservation targets as focal points for ecosystem management on Arnold AFB:

- Barrens mosaic
- Karst wetlands
- Streams and springs
- Gray bat (*Myotis griseescens*)

Three of these targets are ecological systems that occur together in the landscape and are interconnected through ecological processes and environmental gradients. A Barrens Management Plan has been developed for the Barrens mosaic on Arnold AFB (Strohmeier, 2003). This plan directs the use of management tools, including IPP management, for ecological restoration and maintenance on approximately 3,500 acres during the period from Fiscal Year (FY) 2003 through FY 2008.

A key conservation target in the Barrens mosaic management program is preservation or expansion of the population of Eggert's sunflower (*Helianthus eggerti*), a federally listed threatened species that occurs on Arnold AFB. The species is proposed for delisting as a result of management efforts implemented throughout its range, including Arnold AFB. The Base, in informal consultation with the United States Fish and Wildlife Service (USFWS), has developed an Eggert's Sunflower Management Plan (Fitch, 2003) to support recovery goals established by USFWS for the species. IPPs, including species that escape from horticultural or other land management uses, are a threat to Eggert's sunflower.

1.4 Objectives of Proposed Action

The goals of the Proposed Action are to:

- Maintain the structure and function of ecologically significant plant communities.
- Restore a functioning mosaic of Barrens habitats.
- Protect high priority sites where plant invasions threaten rare species habitats.
- Develop monitoring protocols to track management effects and detect new IPP occurrences.

1.5 Related Environmental Documents

The following documents were used in the preparation of this Environmental Assessment (EA):

- Two-Year Conservation Management Plan 2005-2006, Arnold Engineering Development Center, Arnold Air Force Base, Tennessee, for Arnold Air Force Base, prepared by ATA Conservation.
- Barrens Management Plan Annual Update 2003, Arnold Engineering Development Center, Arnold Air Force Base, Tennessee, for Arnold Air Force Base, prepared by Clint Strohmeier, Restoration Ecologist ACS Environmental Services, Conservation.
- Integrated Ecosystem Management Plan 2003, Arnold Engineering Development Center, Arnold Air Force Base, Tennessee, for Arnold Air Force Base, prepared by Geoff Call, Conservation Biologist ACS Environmental Services, Conservation.
- Invasive Pest Plant Management Plan 2004, Arnold Engineering Development Center, Arnold Air Force Base, Tennessee, for Arnold Air Force Base, prepared by Carrie Miller, Invasive Plant Manager, ATA Environmental Services, Conservation.

1.6 Decision to Be Made

A decision is required regarding the impacts of implementing the IPP Management Plan (Miller, 2004) within the framework of the Arnold AFB IEMP, Forest Management Plan (FMP), Eggert's Sunflower Management Plan, and Barrens Management Plan.

1.7 Applicable Regulatory Requirements, Permits, and Coordination

The following regulations, permits, or coordination may be applicable to an action alternative as described in this EA:

- The National Environmental Policy Act (NEPA) of 1969
- Title 40 of the Code of Federal Regulations (CFR), Parts 1500-1508 (40 CFR 1500-1508)
- DoD Directive 6050.1 (32 CFR 214)
- Air Force Instruction (AFI) 32-7061

- EO 11514, Protection and Enhancement of Environmental Quality (amended by EO 11991)
- The Endangered Species Act of 1973 (16 U.S. Code [USC] 1531-1543),
- The Fish and Wildlife Coordination Act (16 USC 661, et seq.),
- The Migratory Bird Treaty Act (16 USC 701, et seq.)
- The Clean Water Act (CWA) of 1977 and the Water Quality Act (WQA) of 1987 (33 USC 1251 et seq., as amended)
- EO 11990, Protection of Wetlands
- AFI 32-7061
- EO 12372, Intergovernmental Review of Federal Programs
- The Farmland Protection Act of 1981 (7 USC 4201 et. seq., as amended)
- DoD 4165.57, Air Installation Compatible Use Zone (AICUZ)
- The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (as amended by the Superfund Amendments and Reauthorization Act [SARA] of 1986)
- The Resource Conservation and Recovery Act of 1976 (RCRA)
- The Toxic Substances Control Act (TSCA)
- The National Historic Preservation Act (NHPA) of 1966 (16 USC 470 et seq., as amended)
- The Protection of Historic Properties (36 CFR 800) Act
- The Archeological Resources Protection Act of 1979
- EO 11988, Floodplain Management
- The Clean Air Act (CAA) (42 USC 7401 et seq., as amended)
- The Noise Control Act of 1972
- EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations
- EO 13045, Protection of Children from Environmental Health Risks and Safety Risk
- EO 13112, Invasive Species

1.8 Authority and Scope of the Environmental Assessment

This document was prepared in accordance with the requirements of the NEPA of 1969, the Council on Environmental Quality (CEQ) regulations of 1978, and 32 CFR Part 989. To initiate the environmental analysis, the proponent (Arnold AFB) submitted an AF Form 813 – Request for Environmental Impact Analysis (Appendix A).

1.8.1 Issues Eliminated from Detailed Analysis

The Proposed Action would not have the potential for significant impacts to all resource areas on Arnold AFB. Consequently, the resource areas discussed below have been eliminated from detailed analysis in this document.

1.8.1.1 Land Use

The Proposed Action would be consistent with the IEMP, FMP, Barrens Management Plan, and Eggert's Sunflower Management Plan. The Proposed Action would not result in changes in land use. As there would be no change in land use, land use was eliminated as an issue warranting further analysis.

1.8.1.2 Noise

The Proposed Action would require limited use mounted herbicide application systems, as well as tractors for mowing. The use of this equipment would generate noise. However, equipment use would occur only during regular working hours, workers would wear proper hearing protection, and the noise from mowing and mounted herbicide application would be temporary. Other than workers, there are no potential sensitive receptors for the noise from IPP management. Therefore, noise was eliminated as an issue warranting further analysis.

1.8.1.3 Air Installation Compatible Use Zone (AICUZ) and Airfield Operation

The Proposed Action would not constitute an incompatible use with designated restricted areas around the airfield and would not interfere with airfield operations. Therefore, AICUZ was eliminated as an issue warranting further analysis.

1.8.1.4 Air Quality

Chemical applications and combustive emissions from operation of tractors or other vehicles would be of short duration, and any associated air quality issues would be temporary. Specific applications would be relatively small, located in different areas, and separated in time. Only minor to negligible impacts to air quality would be expected from these activities. Therefore, air quality was eliminated as an issue warranting further analysis.

1.8.1.5 Geology and Geomorphology

No activities conducted under the Proposed Action would affect the underlying geologic features of Arnold AFB or surface geomorphology. Therefore, geology and geomorphology were eliminated as issues warranting further analysis.

1.8.1.6 Hydrology

None of the activities under the Proposed Action would alter hydrology on Arnold AFB. Therefore, hydrology was eliminated as an issue warranting further analysis.

1.8.1.7 Socioeconomic Factors

Socioeconomic factors are associated with the human environment, including demographics, community infrastructure and services, employment and wages,

recreation, and environmental justice. The Proposed Action would have no significant effect on socioeconomic factors. There would be no increase or loss in permanent staffing positions on Arnold AFB, nor would there be any gain or loss of permanent employment in the surrounding region. The IPP management areas are on Arnold AFB and the Proposed Action would not impact minority or low income population groups. There would be no change in demand for recreational facilities or opportunities and no change in recreational facilities or opportunities available to the staff of Arnold AFB or residents of the region. The IPP management program would not cause people to move into or out of the area. With no change in population, the Proposed Action would not result in a change in demand for community infrastructure and services (fire, police, medical, housing, schools, etc.). Therefore, socioeconomic factors were eliminated as an issue warranting further analysis.

1.8.1.8 Cultural Resources

Cultural resources are defined as archaeological areas and historical architectural properties. Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts, and any other physical evidence of human activity considered important to a culture or community for scientific, traditional, religious, or other reasons. The Proposed Action would not impact any historic or archeological resources on Arnold AFB. Therefore, cultural resources were eliminated as an issue warranting further analysis.

1.8.2 Issues Studied in Detail

The resource areas below are discussed in detail in this document:

- Safety and Occupational Health
- Hazardous Materials
- Water Quality
- Biological Resources
- Environmental Restoration Program

1.9 Document Organization

This EA follows the organization established by the CEQ regulations (40 CFR, Parts 1/500-1508) and consists of the following sections:

- 1.0 Purpose and Need for Action
- 2.0 Description of the Proposed Action and Alternatives
- 3.0 Affected Environment
- 4.0 Environmental Consequences
- 5.0 Plan, Permit, and Management Requirements
- 6.0 List of Preparers
- 7.0 List of Contacts
- 8.0 References
- Appendices

2.0 Description of Proposed Action and Alternatives

As required by federal regulation, this EA addresses the possible environmental impacts of the Proposed Action and a No-Action Alternative. This section provides a summary of the issues and potential impacts associated with the Proposed Action and No-Action Alternative.

2.1 Proposed Action (Preferred Alternative)

IPP management involves four general strategies for controlling and/or eradicating invasive species:

- Manual and Mechanical Control
- Chemical Control
- Prescribed Burning
- Biological Control

Manual control involves the use of physical techniques related to hand-operated or mechanical equipment to actively remove the IPP. Techniques used by Arnold AFB include: hand pulling, pulling using tools, mowing and cutting, and girdling (removing a strip of bark on a single-trunk tree or shrub).

Chemical control involves application of herbicides to control IPPs. Arnold AFB maintains an active program to review and approve the specific chemicals used in IPP management. Chemical spraying is done by a State of Tennessee certified pesticide applicator through a contract. Herbicides that have been selected for use in the IPP program on Arnold AFB include Metsulfuron-methyl (trade name Escort), clopyralid (trade name Transline), triclopyr triethylamine salt (trade name Garlon 3A), triclopyr butoxyethyl ester (trade name Garlon 4), and imazapic (trade name Plateau). Herbicide application is conducted using two general methods:

- Foliar application – spraying herbicide directly onto the leaves of the IPP (spot application), wiping herbicide onto the plant to prevent overspray (wick application), or large-scale spraying (boom application).
- Cut surface – spraying herbicide on a freshly cut tree or shrub either in a circumference around the trunk or applying directly to a cut or drilled area in the trunk (hack and squirt).

Prescribed burning involves setting controlled fires to prevent flowering and reseeding of IPPs. Restoring habitat types (e.g., Barrens mosaic) promotes native species that can more readily out-compete exotic species. Many IPP species on Arnold AFB (i.e., bicolor lespedeza, autumn olive, and tree of heaven) are fire-tolerant and respond to prescribed burning activities, thus necessitating the use of other control techniques.

Biological control involves exerting pressure on an IPP to reduce its abundance by introducing control agents (usually insects) that feed on the IPP. Biological control agents and their interaction with IPPs must be carefully analyzed prior to use. At present, active biological control is not a component of the Arnold AFB IPP Management Plan.

Arnold AFB has divided the Base into management units (MUs) based on natural or man-made landscape divisions. The MU forms the spatial basis for inventorying and managing IPPs. Table 2-1 outlines the management strategies planned for Arnold AFB during FY 2005 and 2006. Figures 2-1 through 2-5 show the proposed locations of IPP management on Arnold AFB.

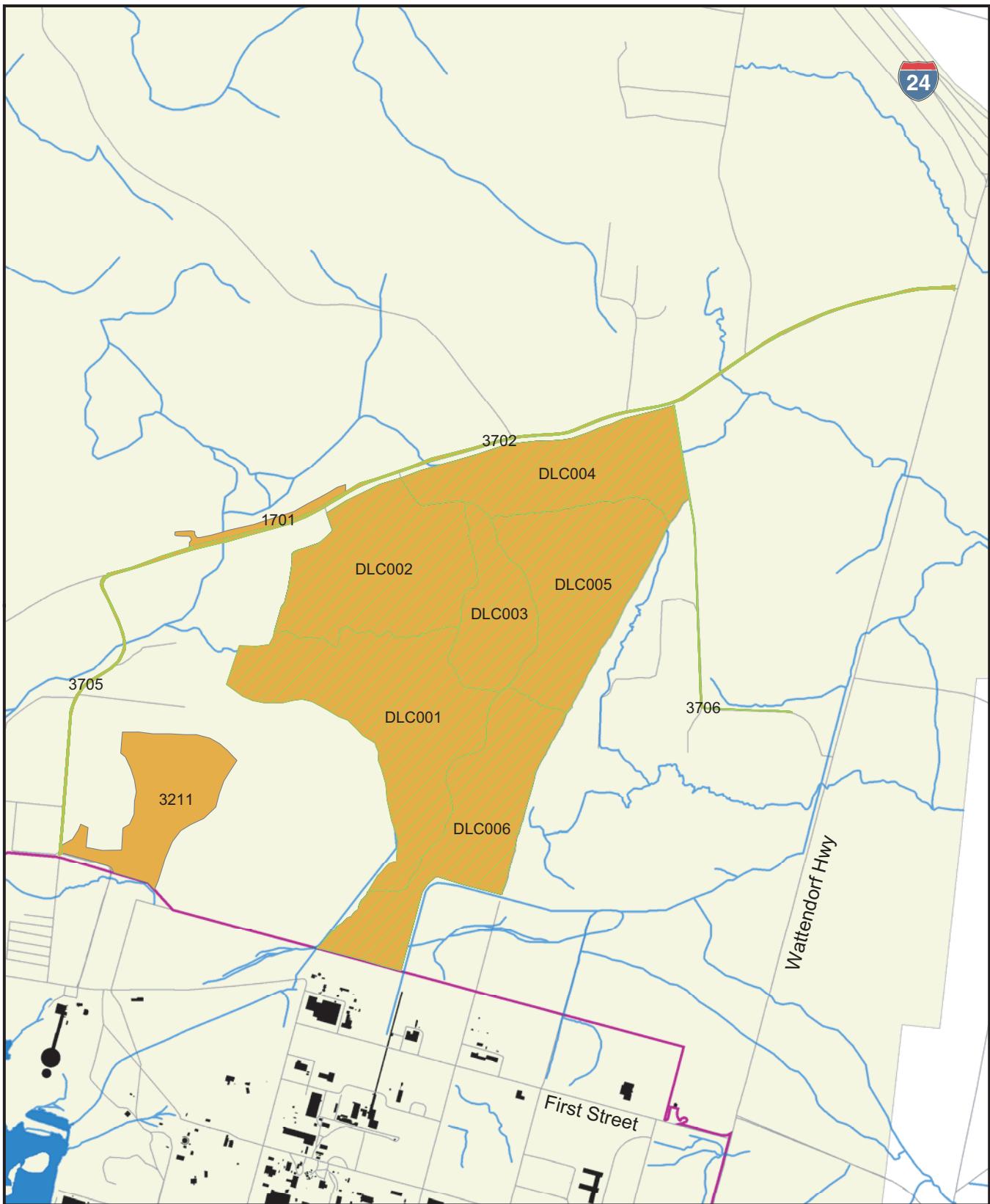
TABLE 2-1
IPP Management and Strategies Proposed for Designated MUs on Arnold AFB in FY 2005 and 2006
Invasive Pest Plant Management Final Environmental Assessment

Management Unit	Invasive Pest Plant Problem	Management Method	Proposed Date FY 2005	Proposed Date FY 2006
AFB005	Fescue	Chemical	11/30/2004	
4255	Privet	Chemical	12/15/2004	
AFB001, 002, 003, 004, 005	Crown Vetch	Chemical	4/1/2005	4/1/2006
4255, 4256	Trifoliate Orange	Chemical	4/1/2005	
DLC002, 003, 004	Autumn Olive	Chemical	4/1/2005	
DLC004, 005, 006	Tree of Heaven	Chemical	4/1/2005	
1701, 9123	Autumn Olive	Chemical	4/1/2005	
AFB001	Fescue	Chemical		5/1/2006
AFB003, 004, 010	Fescue	Chemical	5/1/2005	
AFB005	Fescue	Chemical	5/1/2005	5/1/2006
AFB001, 002, 003, 004, 005, 010	Johnsongrass	Chemical	5/1/2005	5/1/2006
AFB001, 002, 003, 004, 005	Musk Thistle	Manual	5/30/2005	5/30/2006
9120, 9121, 9123, 9251, 9252, 9254, 9256, 9257, 9706, AFB001, 002, 003, 004, 005, 010	Lespedeza	Chemical	9/30/2005	9/30/2006
AFB001, 002, 004	Pine	Manual	9/30/2005	9/30/2006
AFB002	Tree of Heaven	Chemical	9/30/2005	9/30/2006
4255	Privet	Chemical	12/15/2004	12/15/2005
4253, 4255, 4256, 4354	Trifoliate Orange	Chemical	4/1/2005	4/1/2006
4253, 4255, 4352, 4354	Multiflora Rose	Chemical	6/1/2005	6/1/2006
4253, 4255, 4352, 4354	Garlic Mustard	Chemical	6/15/2005	6/15/2006
4249, 4250, 4251, 4252, 4253, 4255, 4256, 4257, 4258, 4259, 4260, 4352, 4354, 4357, 4358, 4359, 4360, 4361	Garlic Mustard	Manual	6/15/2005	6/15/2006
4255, 4354	Mimosa	Chemical	6/30/2005	6/30/2006
4352, 4354	Privet	Chemical	9/30/2005	12/15/2005
7465	Kudzu	Chemical	9/30/2005	9/30/2006
3706	Crown Vetch	Chemical	4/1/2005	4/1/2006
3706	Common Mullein	Manual	6/15/2005	6/15/2006
3706	Musk Thistle	Manual	6/15/2005	6/15/2006
3706	Mimosa	Chemical	6/30/2005	6/30/2006
3706	Lespedeza	Chemical	9/30/2005	9/30/2006
DLC002, 003, 004	Autumn Olive	Chemical	4/1/2005	4/1/2006

TABLE 2-1

IPP Management and Strategies Proposed for Designated MUs on Arnold AFB in FY 2005 and 2006
Invasive Pest Plant Management Final Environmental Assessment

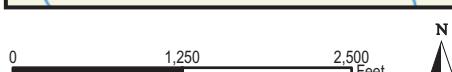
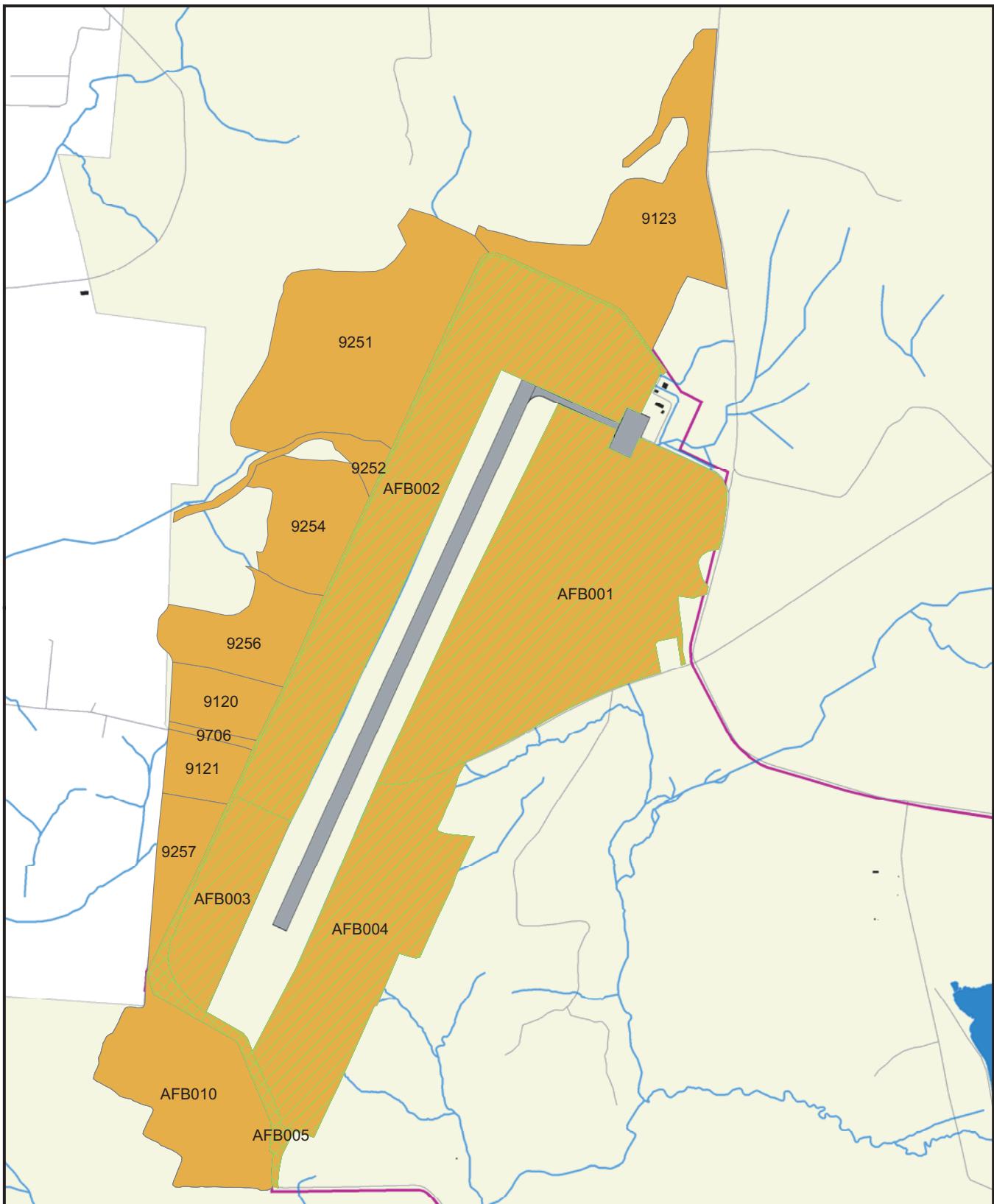
Management Unit	Invasive Pest Plant Problem	Management Method	Proposed Date FY 2005	Proposed Date FY 2006
DLC002	Periwinkle	Chemical	4/1/2005	4/1/2006
DLC001, 002, 004, 005, 006	Tree of Heaven	Chemical	4/1/2005	4/1/2006
DLC002, 004, 006	Crown Vetch	Chemical	5/1/2005	5/1/2006
DLC004, 006	Multiflora Rose	Chemical	6/1/2005	6/1/2006
DLC002	Johnsongrass	Chemical	6/15/2005	6/15/2006
DLC006	Mimosa	Chemical	6/30/2005	6/30/2006
DLC002, 004, 006	Lespedeza	Chemical	9/30/2005	9/30/2006
DLC001, 002, 004, 005, 006	Pine	Manual	9/30/2005	9/30/2006
DLC003	Pine	Manual		9/30/2006
1701	Autumn Olive	Chemical	4/1/2005	4/1/2006
3702	Crown Vetch	Chemical	4/1/2005	4/1/2006
3702	Fescue	Chemical	5/1/2005	5/1/2006
3702	Johnsongrass	Chemical	5/1/2005	5/1/2006
3702	Common Mullein	Manual	6/15/2005	6/15/2006
3702	Musk Thistle	Manual	6/15/2005	6/15/2006
3702	Lespedeza	Chemical	9/30/2005	9/30/2006
3211	Tree of Heaven	Chemical	4/1/2005	4/1/2006
4276	Garlic Mustard	Manual	6/15/2005	6/15/2006
4276	Garlic Mustard	Chemical	6/15/2005	6/15/2006
4276	Privet	Chemical	9/30/2005	9/30/2006
3705	Crown Vetch	Chemical	4/1/2005	4/1/2006
3705	Fescue	Chemical	5/1/2005	5/1/2006
3705	Johnsongrass	Chemical	5/1/2005	5/1/2006
3705	Common Mullein	Manual	6/15/2005	6/15/2006
3705	Musk Thistle	Manual	6/15/2005	6/15/2006
3705	Lespedeza	Chemical	9/30/2005	9/30/2006
MAF001	Autumn Olive	Chemical	4/1/2005	4/1/2006
MAF001	Lespedeza	Chemical	9/30/2005	9/30/2006
MAF001	Pine	Manual	9/30/2005	9/30/2006
MAF001	Privet	Chemical	9/30/2005	9/30/2006
SWH001	Autumn Olive	Chemical	4/1/2005	4/1/2006
SWH001	Multiflora Rose	Chemical	6/1/2005	6/1/2006
SWH001	Johnsongrass	Chemical	6/15/2005	6/15/2006
SWH001	Kudzu	Chemical	9/30/2005	9/30/2006
SWH001	Lespedeza	Chemical	9/30/2005	9/30/2006
SWH001	Pine	Manual	9/30/2005	9/30/2006
SWH001	Privet	Chemical	9/30/2005	9/30/2006
9294	Johnsongrass	Chemical	6/15/2005	6/15/2006
9298, 9304, 9306	Paulownia	Chemical	9/30/2005	9/30/2006
9285, 9287, 9288, 9294, 9298, 9304, 9305, 9716	Tree of Heaven	Chemical	9/30/2005	9/30/2006
9123	Autumn Olive	Chemical	4/1/2005	4/1/2006



Areas Proposed for Invasive Pest Plant Management for FY 2005-2006 - Northeastern



Figure 2-1
Invasive Pest Plant Management
Final Environmental Assessment



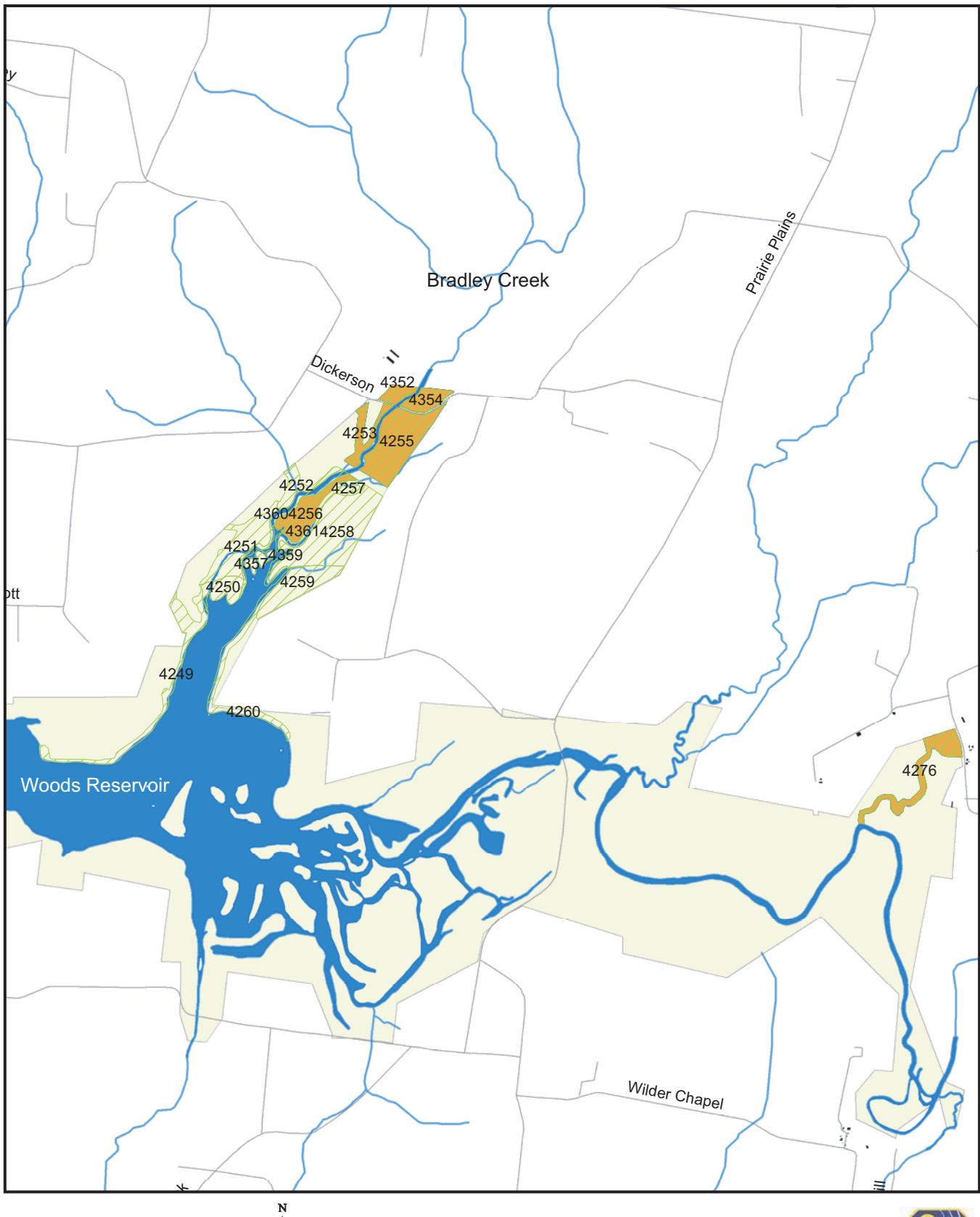
- Manual Removal 05-06
- Chemical Removal 05
- AEDC Boundary
- Airfield
- Arnold AFB Boundary
- Streams
- Road Centerline
- Buildings
- Reservoirs

Areas Proposed for Invasive Pest Plant Management for FY 2005-2006 - Northwestern

*Invasive Pest Plant Management
Final Environmental Assessment*



Figure 2-2



0 1,250 2,500 Feet



 Manual Removal 05-06
 Chemical Removal 05
 Arnold AFB Boundary

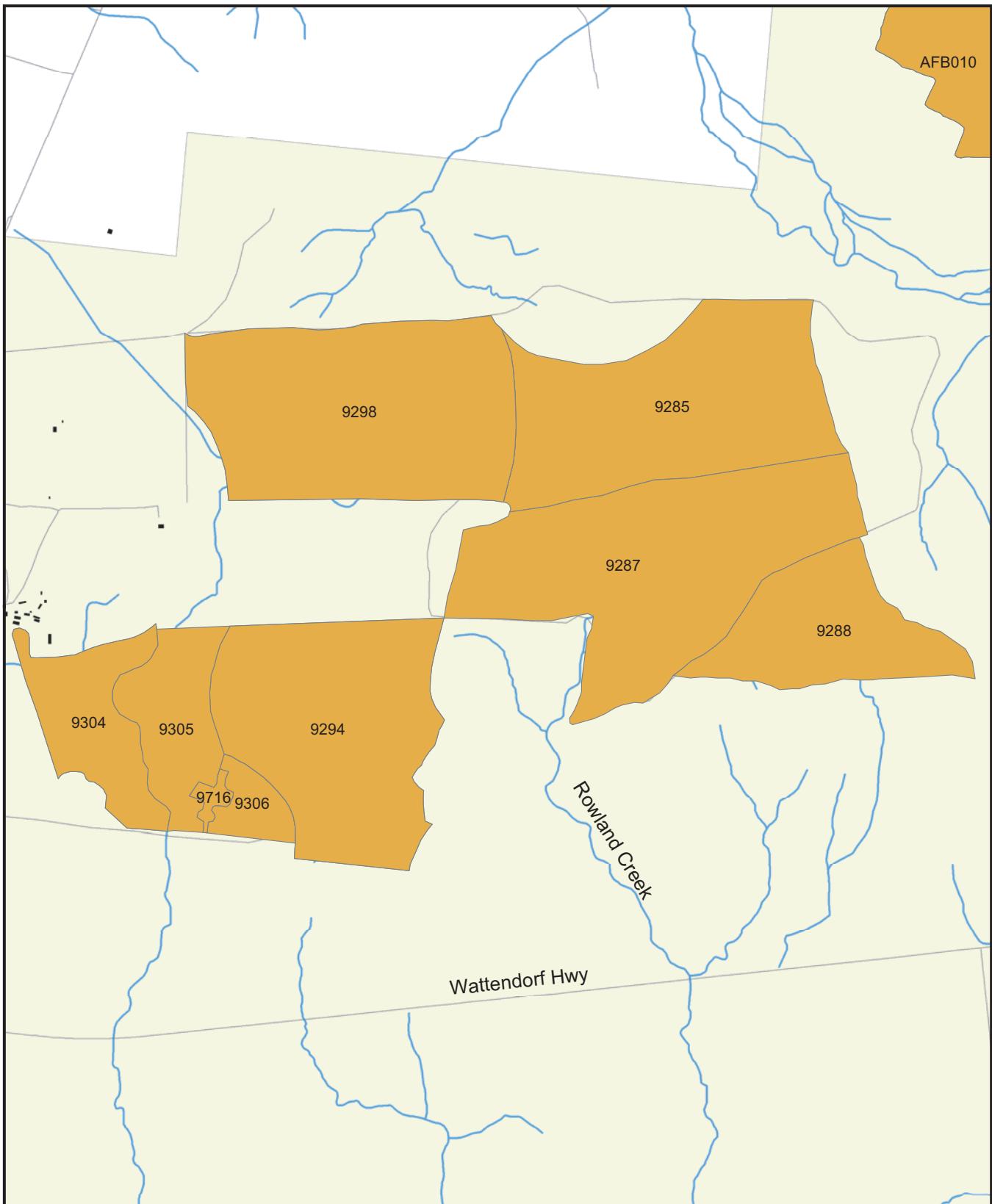
— Streams
— Road Centerline
■ Buildings
 Reservoirs

Areas Proposed for Invasive Pest Plant Management for FY 2005-2006 - Southeastern

*Invasive Pest Plant Management
Final Environmental Assessment*



Figure 2-3

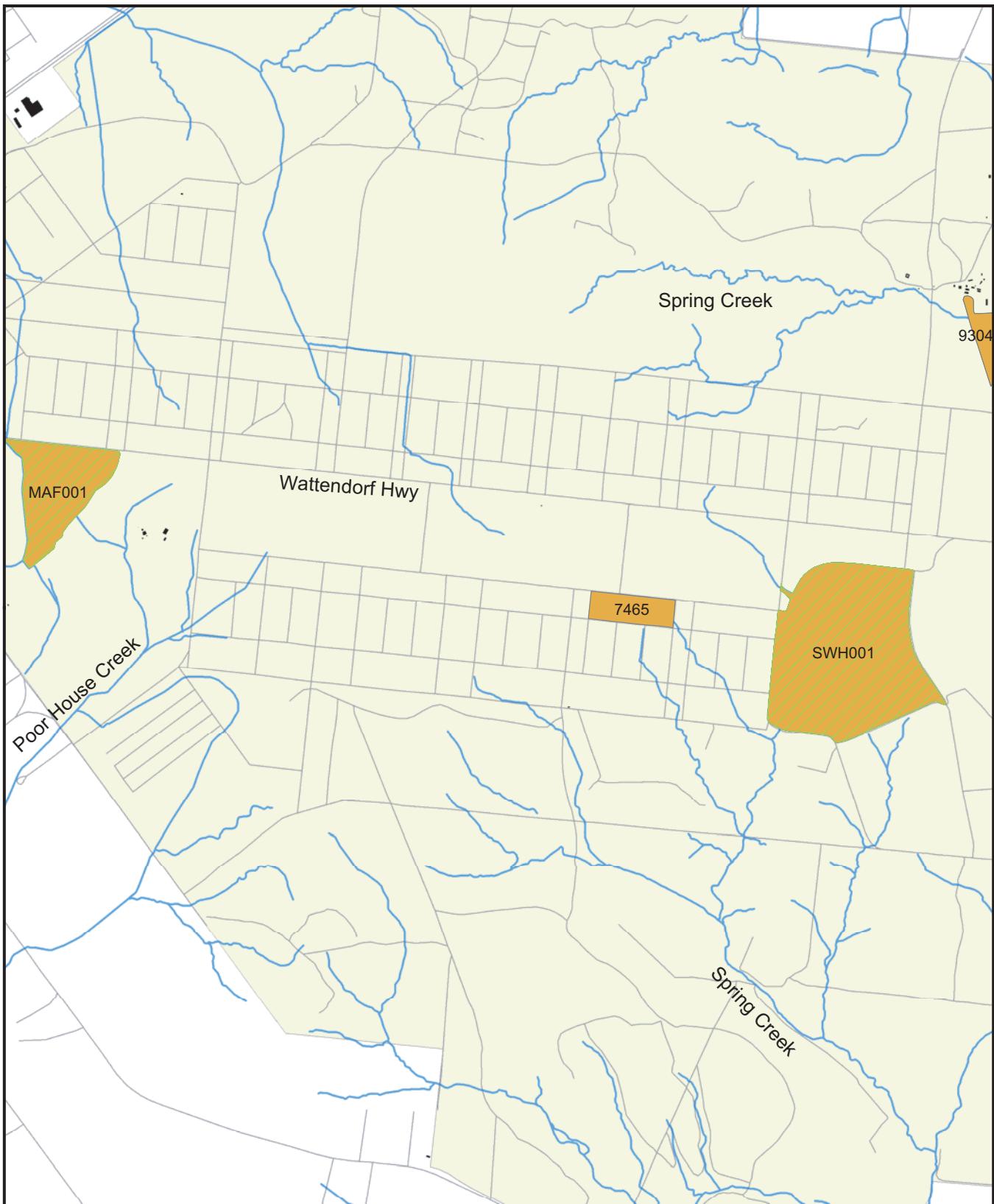


Areas Proposed for Invasive Pest Plant Management for FY 2005-2006 - West Central

*Invasive Pest Plant Management
Final Environmental Assessment*



Figure 2-4



0 1,250 2,500 Feet



 Manual Removal 05-06
 Chemical Removal 05-06
 Arnold AFB Boundary

— Streams
— Road Centerline
■ Buildings

Areas Proposed for Invasive Pest Plant Management for FY 2005-2006 - Western

*Invasive Pest Plant Management
Final Environmental Assessment*



Figure 2-5

The Proposed Action is to implement the IPP Management Plan to control these species through prescribed burning, chemical application, and manual removal. The Proposed Action would fulfill the goals of the FMP and meet the overall objectives for natural resource management on Arnold AFB.

The preferred alternative is the Proposed Action.

2.2 No-Action Alternative

The No-Action Alternative would be not to conduct IPP management on Arnold AFB. Under this alternative, the goals of the IEMP would not be met. The No-Action Alternative would also not result in an enhanced environment for sensitive species, such as Eggert's sunflower. As a result, the No-Action Alternative does not meet the stated goals.

2.3 Alternatives Considered but Not Carried Forward

NEPA requires that the Proposed Action, No-Action Alternative, and any other practicable alternatives be considered in the analysis. As discussed above, under the need for the project, the IPP Management Plan was developed to implement management measures defined in the IEMP. The overriding objective is to restore or maintain healthy, functioning ecosystems at Arnold AFB.

The proposed IPP management schedule for a given fiscal year is determined through long-range planning. This schedule is developed by Conservation staff using a regularly updated inventory of MU conditions and conservation needs. These plans are developed with input from the members of the Conservation Integrated Process Team (IPT). The IPT, an interdisciplinary team of experts, was established as part of the resource conservation process at Arnold AFB to review existing and proposed management actions for their impacts. The IPT includes members from:

- AEDC
- Tennessee Army National Guard
- TDEC, Division of Natural Heritage
- Tennessee Wildlife Resources Agency (TWRA)
- USFWS
- The United States Geological Survey (USGS)
- Middle Tennessee State University
- The Nature Conservancy
- The University of the South
- The University of Tennessee

The coordinated process identifies ecosystem management practices, including IPP management, that promote sound conservation to produce a balanced forest community that provides maximum return on all forest resources, which are identified as commercial forest products, wildlife, soils, water, outdoor recreational opportunities, and aesthetics (ACS Conservation, 2003).

Potential IPP management alternatives that were not developed through this integrated process are not considered practicable for achieving the forest and ecosystem management goals of Arnold AFB. Therefore, no other action alternatives are considered in this analysis. Any other IPP management alternative would have been less integrated with other natural resource management on the Base, and would not have provided the same level of desired long-term ecosystem management on Arnold AFB.

2.4 Comparison of Alternatives

The Proposed Action and the No-Action Alternative are compared in Table 2-2.

TABLE 2-2
Comparison of Impacts of the Proposed Action and the No-Action Alternative
Invasive Pest Plant Management Final Environmental Assessment

Resource Area	Proposed Action	No-Action Alternative
Safety and Occupational Health	Potential impacts from physical removal of IPP and chemical concerns related to herbicides. Proper use of personal protective equipment and equipment operation for IPP removal would be used during management practices.	No impacts
Hazardous Materials	Potential impacts from the use of hazardous materials would result from spills that occur during herbicide application. Spills could also occur if the transporting vehicle were in an accident.	No impacts
Water Quality	Non-point source (NPS) pollution could result from plant removal and chemical spraying. Possible NPS pollutants from IPP management include vehicle fluids, organic matter, and herbicides. Selection of appropriate chemical and proper application techniques and controls would be used to prevent runoff into adjacent waters.	No impacts.
Biological Resources	Potential negative impacts due to incidental injury or mortality of non-target species from control efforts. Animal species may be displaced during IPP activities. Benefits may result from improved habitat quality following IPP management. Benefit to species assemblage, including sensitive species, associated with Barrens mosaic ecosystem.	Negative impact on habitat for sensitive species (e.g. Eggert's sunflower and species associated with Barrens mosaic).
Environmental Restoration Program (ERP)	No impacts.	No impacts.

3.0 Affected Environment

This section describes the areas in which impacts may occur as a result of implementing the Proposed Action. These areas are occupational health and safety, hazardous materials, water quality, and biological resources, including sensitive species and sensitive habitats.

3.1 Occupational Health and Safety

Potential safety and occupational health impacts would be related to operation of tractors or other motorized vehicles, use of hand and power tools, and use of chemicals. Tractors may be used to mow IPP populations to prevent or reduce seed production or to provide a platform for use of boom applicators for delivery of herbicides to target species. Trucks or small all-terrain vehicles may be used to support boom applicators. Manual and mechanical removal of IPPs could involve the use of hand tools or physical pulling without tools. Chemical mixing and handling could result in exposure to potentially harmful chemicals. Potential risks to workers and safeguards to reduce risks would be monitored.

Job Safety Analyses (JSAs) are prepared for all operational activities on the Base. The JSA is a documented process in which all tasks are outlined in a step-wise fashion (Appendix B). Actual or predicted hazards of each step are defined in writing on a JSA worksheet. The required controls and precautions for eliminating or reducing each listed hazard are identified. The JSA is continually updated to reflect changes in hazards identified and responses to those hazards. Before any job or task begins, the JSA for that particular endeavor is communicated to the personnel assigned to that job. Each individual must sign the appropriate JSA prior to working on any job. The signature is an acknowledgement that the employee has read and understands the JSA and would implement all applicable controls and precautions.

3.2 Hazardous Materials

Materials used in chemical control of IPP species, including herbicides and surfactants, may be classified as hazardous. Chemical control of IPP species on Arnold AFB is done by a subcontractor who is certified by the State of Tennessee as a herbicide applicator (Carrie Miller, personal communication, 2004). All chemical storage and equipment cleaning are performed at the herbicide applicator's facility. No materials or wastes are stored or disposed of on-Base. Associated risks with hazardous material would be related to accidental spills occurring during application.

Arnold AFB has adopted a Spill Prevention and Response Plan (SPRP) that outlines prevention, response and control, containment and countermeasures, and corrective actions associated with any spills. This plan complies with the requirements of the Federal Water Pollution Control Act (FWPCA or CWA) as amended (33 U.S.C. 1251 et

seq.), RCRA as amended (42 U.S.C. 6901 et seq.), and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, commonly called Superfund) as amended (42 U.S.C. 9601 et seq.).

3.3 Water Quality

Arnold AFB is located in two watersheds (Figure 3-1), with the divide between the Elk River and the Duck River basins generally following the middle of the Base; floodplains are defined for several drainages on the Base (Figure 3-2). Within the Duck River basin in the vicinity of the proposed project, there are only two streams that do not fully meet their designated uses. Both the Duck River and the Little Duck River have elevated bacteria levels near the City of Manchester, attributed to failing sewage collection systems within the city and general urban runoff (TDEC, 2002).

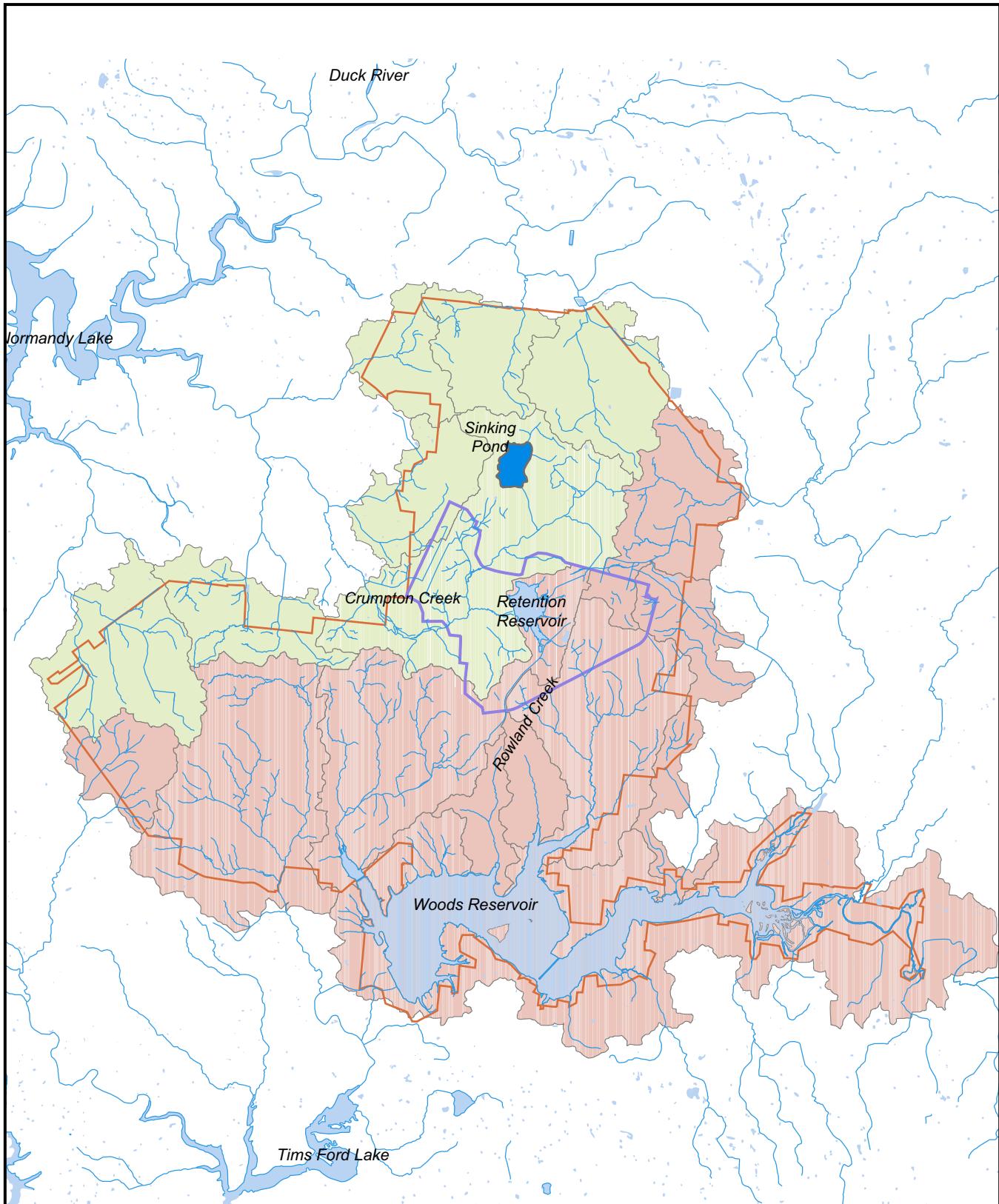
The Elk River basin has 12 water bodies on the final version of the 2002 Section 303(d) list, which was issued in January 2004 (United States Environmental Protection Agency [USEPA], 2004). Woods Reservoir, located in the project area, is listed as not supporting its designated uses because of polychlorinated biphenyls (PCB) impairment of sediments resulting from historical PCB releases from AEDC into Woods Reservoir. A No Consumption-General Public (NCGP) fishing advisory has been issued for catfish (TDEC, 2002).

3.4 Biological Resources

Biological resources include the native and introduced terrestrial plants and animals around Arnold AFB. The land areas at Arnold are home to unusually diverse biological resources including numerous sensitive species, habitats, and wetlands. Arnold AFB developed a system of ecological associations based on floral, faunal, and geophysical characteristics. These ecological associations are described in the Arnold AFB IEPM (Call, 2003).

3.4.1 Eastern Highland Rim Ecological Association

Arnold AFB lies within the Barrens region of the Eastern Highland Rim (EHR). Historically, the Barrens probably encompassed a wide range of habitats including forests, woodlands, savannas, shrub-grasslands, and grasslands. Now the area is predominantly natural upland hardwood forests consisting of mixed oak-hickory forests. Much of these oak-hickory forests can be found on cherty ridgetops, on west- and south-facing slopes, and on broad silty uplands. Yellow poplar, oaks, and other upland tree hardwood species dominate north- and east-facing cherty slopes, bottoms of draws, and well-drained upland flats. Swamp hardwood forests consisting of bottomland oaks, gums, and red maple occupy the occasional poorly drained upland flats and depressions.



0 7,500 15,000 Feet



Legend

Hydrology	Duck Watershed
AEDC Boundary	Elk Watershed
Arnold AFB Boundary	Reservoirs



Figure 3-1
Watersheds on Arnold Air Force Base

*Invasive Pest Plant Management
Final Environmental Assessment*

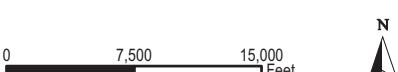
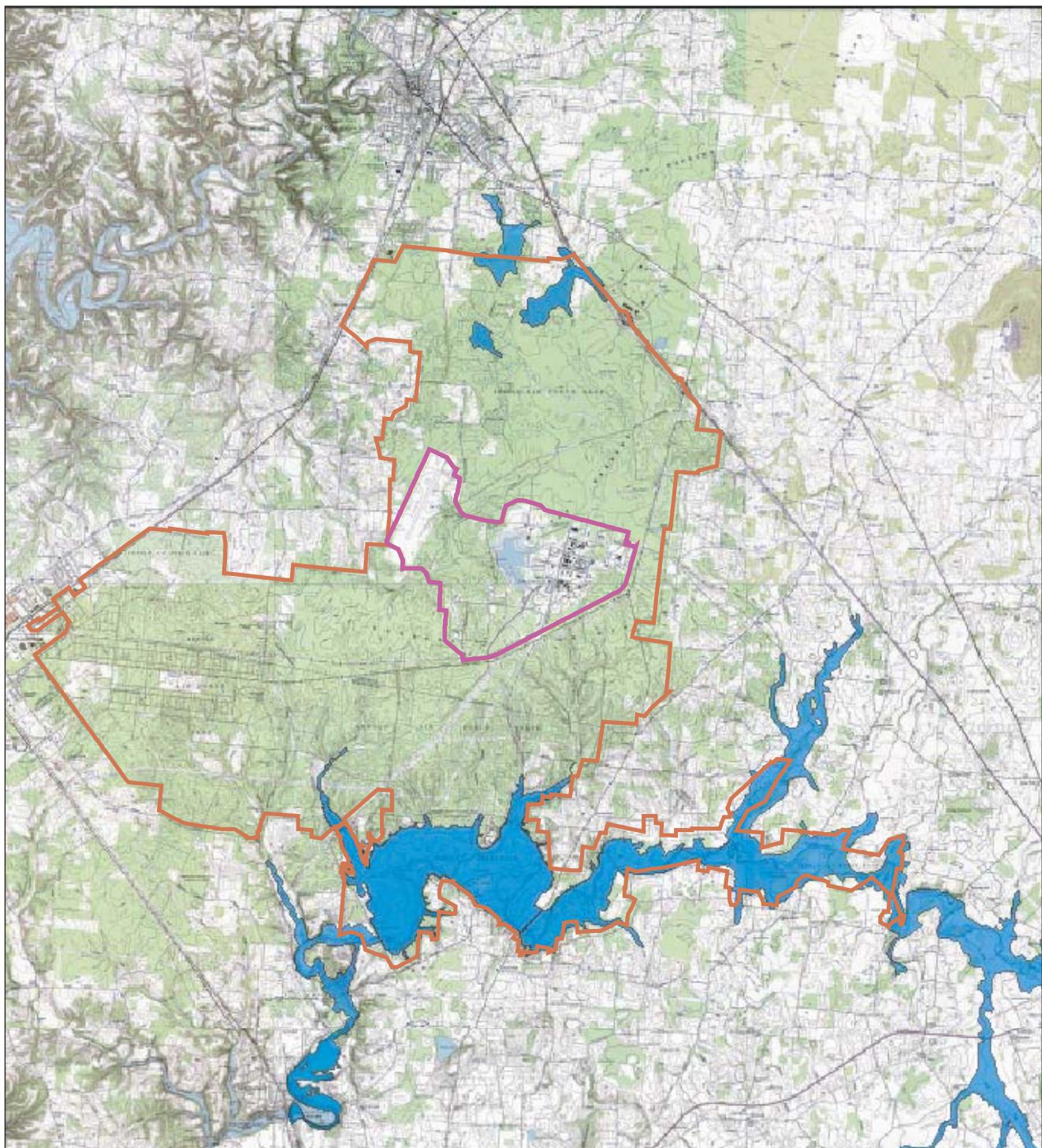


Figure 3-2
Floodplains Located on Arnold Air Force Base
*Invasive Pest Plant Management
Final Environmental Assessment*

3.4.2 Wildlife Species

Wildlife species at Arnold AFB are those common to the central southeastern United States. A literature review was conducted to identify representative common species of mammals, reptiles, amphibians, and birds (Table 3-1).

TABLE 3-1
Common Wildlife Species Occurring in Arnold AFB Vicinity
Invasive Pest Plant Management Final Environmental Assessment

Common Name	Scientific Name
Bats	
Little brown bat	<i>Myotis lucifugus</i>
Northern myotis	<i>Myotis septentrionalis</i>
Red bat	<i>Lasiurus borealis</i>
Eastern pipistrelle	<i>Pipistrellus subflavus</i>
Big brown bat	<i>Eptesicus fuscus</i>
Rodents	
Eastern chipmunk	<i>Tamias striatus</i>
Groundhog	<i>Marmota monax</i>
Eastern gray squirrel	<i>Sciurus carolinensis</i>
Fox squirrel	<i>Sciurus niger</i>
American beaver	<i>Castor canadensis</i>
White-footed mouse	<i>Peromyscus leucopus</i>
Woodland vole	<i>Microtus pinetorum</i>
Raccoon	<i>Procyon lotor</i>
Virginia opossum	<i>Didelphis virginiana</i>
Smokey shrew	<i>Sorex fumeus</i>
Southeastern shrews	<i>Sorex longirostrus</i>
Least shrew	<i>Cryptotis parva</i>
Eastern mole	<i>Scalopus aquaticus</i>
Coyote	<i>Canis latrans</i>
Red fox	<i>Vulpes vulpes</i>
Gray fox	<i>Urocyon cinereoargenteus</i>
Long-tailed weasel	<i>Mustela frenata</i>
Striped skunk	<i>Mephitis mephitis</i>
Bobcat	<i>Lynx rufus</i>
White-tailed deer	<i>Odocoileus virginianus</i>
Eastern cottontail	<i>Silvilagus flavidanus</i>
Amphibians	
Eastern newt	<i>Notophthalmus viridescens</i>
Spotted salamander	<i>Ambystoma maculatum</i>
Two-lined salamander	<i>Eurycea bislineata</i>
Bull frog	<i>Rana catesbeiana</i>
Green frog	<i>Rana clamitans</i>
Pickerel frog	<i>Rana palustris</i>

TABLE 3-1

Common Wildlife Species Occurring in Arnold AFB Vicinity
Invasive Pest Plant Management Final Environmental Assessment

Common Name	Scientific Name
Southern leopard frog	<i>Rana sphenocephala</i>
Spring peeper	<i>Hyla crucifer</i>
Chorus frog	<i>Pseudacris triseriata</i>
American toad	<i>Bufo americanus</i>
Woodhouse's toad	<i>Bufo woodhousei</i>).
Reptile Species	
Common snapping turtle	<i>Chelydra serpentina</i>
Mud turtle	<i>Kinosternon subrubrum</i>
Musk Turtle	<i>Sternotherus odoratus</i>
Red-eared slider	<i>Trachemys scripta</i>
Eastern box turtle	<i>Terrapene carolina</i>
Eastern spiny softshell	<i>Apalone spinifera</i>
Eastern fence lizard	<i>Sceloporus undulatus</i>
six-lined racerunner	<i>Cnemidophorus sexlineatus</i>
Five-lined skink	<i>Eumeces fasciatus</i>
Broad-headed skink	<i>Eumeces laticeps</i>
Black racer	<i>Coluber constrictor</i>
Corn snake	<i>Elaphe guttata</i>
Black rat snake	<i>Elaphe obsoleta</i>
Common Kingsnake	<i>Lampropeltis getulus</i>
Northern water snake	<i>Nerodia sipedon</i>
Rough green snake	<i>Opheodrys aestivus</i>
Common garter snake	<i>Thamnophis sirtalis</i>
Copperhead	<i>Agkistrodon contortrix</i>

Mammal species from Lamb 2004a, Mullen et al. 1995; Bailey et al., 2003; J.W. Lamb personal communication, 2004; Amphibian species from Mullen et al. 1995; J.W. Lamb personal communication, 2004; Reptile species from Mullen et al. 1995; Bailey et al., 2003; J.W. Lamb personal communication, 2004.

A study was conducted in 2000 to document bird use of wetland flats and depressions (Roberts et al., 2001). This study identified 59 breeding season birds using wetland areas, including 34 neotropical migrant species. Forty-six bird species were identified using the wetland flats and depressions in winter. A list of the species identified during this study is provided in the report (Roberts et al., 2001). Eighty-six bird species have been documented breeding at Arnold AFB (Lamb, 1999, 2000, 2001, 2002, 2003a, 2004a). Including summer residents, migrants, and wintering species, a total of 226 species have been documented at Arnold AFB (J.W. Lamb, unpublished data).

In the 1950s, a comprehensive game management plan was initiated to increase wildlife populations so that reasonable harvests by the public would be possible. From 1954 to 1964, over 17,000 quail, 6,000 pheasant, 64 deer, and 21 turkeys were stocked. In 1974, the stocking of Canada goose began, with 53 geese stocked on the Retention Pond. An

additional 50 geese were stocked in 1975. There are now abundant populations of deer, quail, geese, and turkeys on Arnold AFB. Since deer hunting was initiated in 1965, a total of 21,308 deer have been harvested (Call, 2003).

3.4.3 Plant Species

The plant species found at Arnold AFB are those common to the EHR Ecological Association. Oak-hickory forest and a mosaic of bluestem prairie and oak-hickory forest dominate this association. The predominant vegetation form is temperate low land and submontane broad-leaved cold-deciduous forest. Oaks (*Quercus* spp.) are the dominant canopy species. Hickories (*Carya* spp.), including pignut (*C. glabra*), mockernut (*C. tomentosa*), shagbark (*C. ovata*), and bitternut (*C. cordiformis*), form a common but minor component (McNab and Avers, 1994).

Arnold AFB lies in the heart of the Barrens region of the EHR. “Barrens” most often refers to grasslands similar to the Midwestern tallgrass prairie but may also be used to describe openings with scattered trees that may resemble savanna or shrubland. Present vegetation on Arnold AFB is predominantly upland and swamp oak forest. Of the forested areas, 23,816 acres are in native hardwoods and 5,647 acres are in planted, non-native pines. Forested areas are most frequently characterized by closed canopies dominated by various oaks. Dry sites are dominated by post oak (*Q. stellata*), blackjack oak (*Q. marilandica*), scarlet oak (*Q. coccinea*), southern red oak (*Q. falcata*), and black oak (*Q. velutina*). Wet sites are dominated by white oak (*Q. alba*), willow oak (*Q. phellos*), water oak (*Q. nigra*), and overcup oak (*Q. lyrata*). Understories include a wide variety of species such as dogwoods (*Cornus* spp.), maples (*Acer* spp.), sassafras (*Sassafras albidum*), sourwood (*Oxydendrum arboreum*), and blueberries (*Vaccinium* spp.).

Numerous wetlands occur across the Base, with prevailing vegetation ranging from grassland to closed-canopy forest. Several hundred acres of open, prairie-like Barrens occur primarily near the airfield and along powerline and railroad rights-of-way (ROWS). The flora of the region has long been noted for its unusual Coastal Plain disjuncts. Coastal Plain disjuncts are species that normally occur only in the Atlantic or Gulf coastal plains. These species are found nowhere else in Tennessee. To date, over 900 vascular plant species have been recorded on the Base (Call, 2003). The Nature Conservancy and the Tennessee Division of Natural Heritage classified and mapped the vegetation of Arnold AFB. The 33 plant associations delineated for Arnold AFB are listed in Appendix C. Seventeen of the 33 vegetation associations found on Arnold AFB are considered “imperiled” community types.

3.4.4 Sensitive Species

Sensitive species include those with federal endangered or threatened status, species proposed for listing as federal threatened or endangered, and state endangered, threatened, and species of special concern status. An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is any species that is likely to become endangered in the future throughout all or a significant portion of its range due to loss of habitat, anthropogenic effects, or other causes.

AF projects that may affect federally protected species and species proposed for federal listing are subject to the Endangered Species Act (ESA). The ESA requires designation of critical habitat for federally listed species. However, no areas on Arnold AFB are designated as critical habitat under the ESA. The species present on-Base that are protected under the ESA are described below. A list of all sensitive species on Arnold AFB is provided in Appendix D.

3.4.4.1 *Myotis grisescens* (Gray Bat)

In size, the gray bat is the largest eastern representative of the genus *Myotis*. It occupies a limited geographic range in the limestone karst areas of the central and southeastern United States. The gray bat typically uses caves for both winter hibernation and summer roosting/maternity, although different caves are used for these two periods and bats may travel up to 325 miles between winter and summer habitat (Whitaker and Hamilton, 1998). Gray bats have narrow temperature requirements, which reduces the number of caves that are suitable for use. The species is particularly vulnerable, as 95 percent of the population hibernates in only 9 caves, with over half the population hibernating in a single cave (Rommé and Reaves, 1999). The gray bat is federally listed as endangered due to declining numbers and loss of habitat. Flooding of summer maternity caves and hibernacula as a result of reservoir construction has been a major contributor to decline of the species (Rommé and Reaves, 1999).

Informal Section 7 consultations between representatives from Arnold AFB and USFWS occurred in 1978, 1979, and 1996. As a result, a management action plan was developed to coordinate continued Base operations and protection of the gray bat colony in Woods Reservoir Dam and foraging habitat across the Base. The gray bat colony that resides on Arnold AFB in Woods Reservoir Dam is listed as a Priority 2 maternity colony in the USFWS Gray Bat Recovery Plan (1982) and is one of very few maternity colonies that have been identified as using manmade structures for a maternity roost (Lamb, 2003b).

Gray bats forage primarily on aquatic insects along forested riparian corridors and use other forested corridors as travel routes. The canopy provides protective cover from potential predators (Rommé and Reaves, 1999; Lamb, 2003b). Mist net surveys at Arnold AFB have confirmed this life history characteristic, and gray bats have been captured while foraging along Elk River Bottoms, Bradley Creek, Brumalow Creek, and Rowland Creek. Gray bats also have been recorded with AnaBat II™ at Goose Pond, Sinking Pond, Tupelo Swamp, Westall Swamp, and near the Tennessee Valley Authority (TVA) substation.

Juvenile bats typically forage in wooded areas around the maternity cave (Rommé and Reaves, 1999; Lamb, 2003b). Therefore, protection of these areas also is important to recovery and maintenance of the species.

3.4.4.2 *Myotis sodalis* (Indiana Bat)

The Indiana bat is found in the eastern United States from eastern Oklahoma into Vermont and northwestern Florida. Indiana bats hibernate in caves and typically spend summers under the loose bark of trees in upland and bottomland forests and semi-wooded areas (Whitaker and Hamilton, 1998). Typically, Indiana bats make summer roost in hardwood trees with sloughing bark or cavities (Rommé and Reaves, 1999), but

males have been documented roosting among the bark furrows of large pine trees on Wright-Patterson Air Force Base (R.A. King, USFWS, personal communication, 2004). As with gray bats, Indiana bats may migrate several hundred miles between winter and summer habitat (Rommé and Reaves, 1999).

Indiana bats forage on insects in a variety of habitats. This species typically forages in and around the tree canopy of riparian, floodplain, and upland forests. They also may forage along fencerows, crops, clearings, and farm ponds (Rommé and Reaves, 1999).

AnaBat II™ surveys in 2003 identified the possible presence of Indiana bats along Bradley and Brumallow Creeks, but the species has never been captured in mist nets on the Base (Lamb, 2004b). There is some difficulty in positively identifying Indiana bats from calls recorded with an AnaBat II™ detector because of similarity and marginal overlap with other bat species. The USFWS does not currently accept AnaBat II™ identifications in the absence of confirmed captures (Robert Currie, USFWS, communication, 2004 to J.W. Lamb cited in Lamb, 2004b). Additional surveys would be required to confirm the presence of this species on the Base.

*3.4.4.3 *Haliaeetus leucocephalus* (Bald Eagle)*

The bald eagle is a federally threatened species. The bald eagle is found over most of North America, from Alaska and Canada to northern Mexico. There are an estimated 50,000 bald eagles in the United States, with 80 percent found in Alaska (Murphy et al., 1989).

The bald eagle is the only species of sea eagle that lives in North America. In the Southeast, bald eagles build their nests in early September. They usually build their nests in pine trees or bald cypress trees that are 1,000 ft or less from open water. Typically, bald eagles build nests high in trees where they have a clear view of the water. These nests are large compared to the nests of other birds. The cone-shaped nests may be 6 ft across and from 6 to 8 ft from top to bottom (Murphy et al., 1989). Eagles may start laying eggs as early as late October. Most bald eagles in the Southeast lay eggs in the latter part of December (Murphy et al., 1989). To date, no bald eagles have been documented nesting at Woods Reservoir.

Tennessee's bald eagle population is the highest in winter when birds migrate from the north. Most of the birds winter in western parts of the state, particularly at Reelfoot Lake and Dale Hollow Reservoir, but bald eagles may occur on almost any waterway in the state (TWRA, 2004).

Table 3-2 provides the numbers of mature and juvenile bald eagles observed at Woods Reservoir from 1988 through 2004. In most years a single pair of bald eagles winters on Woods Reservoir. Occasional sightings of transient eagles occur, but the species has not been documented nesting on Arnold AFB.

TABLE 3-2

Number of Wintering Bald Eagles at Woods Reservoir (1988-2004)
Invasive Pest Plant Management Final Environmental Assessment

Year	Number of Adults	Number of Immature
1988	0	0
1989	2	0
1990	2	0
1991	2	0
1992	2	1
1993	2	0
1994	2	0
1995	1	0
1996	1	0
1997	2	0
1998	2	0
1999	1	0
2000	2	0
2001	2	0
2002	2	0
2003	2	0
2004	1	1
Total	28	2

Data from J.W. Lamb, unpublished data.

3.4.4.4 *Helianthus eggertii* (Eggert's Sunflower)

Eggert's sunflower is the only federally listed threatened plant species known from Arnold AFB. Management actions for the species are integrated with other aspects of the Arnold AFB ecosystem management program by employing a coarse filter-fine filter approach. This approach involves the restoration and maintenance of vegetation structure and ecological processes in suitable habitats for Eggert's sunflower. Such process-oriented management supports mission flexibility by working at multiple spatial and temporal scales to conserve biological diversity associated with one of the Base's focal conservation targets—the Barrens mosaic (Fitch, 2003). Fine filter protective measures specific to Eggert's sunflower are also taken to ensure that localized destruction of the species or its habitat does not encroach on mission flexibility by violating provisions of the ESA. Management is coupled with monitoring to help track impacts to the plant. AEDC Conservation implements management and develops projects to further the recovery objectives outlined by the USFWS (Fitch, 2003).

All aspects of Eggert's sunflower management on Arnold AFB are planned in coordination with the Cookeville, TN, office of the USFWS. The Service's recommendations are incorporated when developing new management strategies and projects or addressing unforeseen operational impacts (Fitch, 2003).

The document entitled *AEDC Operational Information: Potential Impacts to Helianthus eggertii* was developed and implemented through informal Section 7 consultation under the ESA. This document describes AEDC's operations, lists impacts to Eggert's sunflower that may occur from those operations, and outlines measures to reduce or avoid impacts when implementing Base operations. For each Base operation, the document gives the purpose of the operation, the method by which the operation is implemented, the potential impacts to the Eggert's sunflower resulting from each operation, and how to implement the operation to reduce or eliminate these impacts (Fitch, 2003).

It is understood that informal Section 7 consultation is to be reinitiated if (1) new information reveals impacts of the Proposed Action that may affect listed species or critical habitat in a manner not previously considered, (2) the Proposed Action is subsequently modified to include activities that were not considered during this informal consultation, or (3) new species are listed or critical habitat designated that might be affected by the Proposed Action (Call, 2003).

Prescribed burning, mechanical thinning, and invasive plant management are practices used to manage Eggert's sunflower on Arnold AFB. Eggert's sunflower habitat is maintained through Barrens restoration, forest management, and roads and ground operations, in addition to management of approximately 285 acres designed specifically for the species' conservation (Call, 2003). The management actions are driven by the recovery goals for the species, which are listed in the USFWS Recovery Plan for Eggert's sunflower (White and Ratzlaff, 2000). Through management, Arnold AFB seeks to minimize the threats to Eggert's sunflower, including vegetation succession, habitat destruction, and competition by invasive plants.

3.4.4.5 *Pleurobema gibberum* (Cumberland Pigtoe)

Cumberland pigtoe is a federally threatened aquatic invertebrate bivalve species. A member of the mollusk family, it was previously found to exist at Arnold AFB. A single relict shell was found on Arnold AFB in a 1990 faunal survey (Mullen et al., 1995), but live specimens have never been found on the Base (Call, 2003). Additional relict shells have not been located in surveys conducted by USFWS since 1990 (J.W. Lamb, personal communication, 2004). This species is therefore not considered in this assessment.

3.4.5 Sensitive Habitats

Sensitive habitats are described as those habitats supporting threatened or endangered plant and animal species, areas determined to be exemplary natural communities by federal or state agencies, or habitat areas exceptionally fragile and susceptible to damage. The sensitive habitats meeting these criteria occurring on the Base are the wetlands habitat, woodland/savanna/grassland habitat, and upland dry-mesic forests habitat.

3.4.5.1 Wetlands Habitat

Wetlands are inundated (water-covered) areas or areas where water is present either at or near the surface of the soil for distinguishable periods of time throughout the year.

Local hydrology and prolonged soil saturation largely affect soil formation and development, as well as the plant and animal community composition in wetland areas.

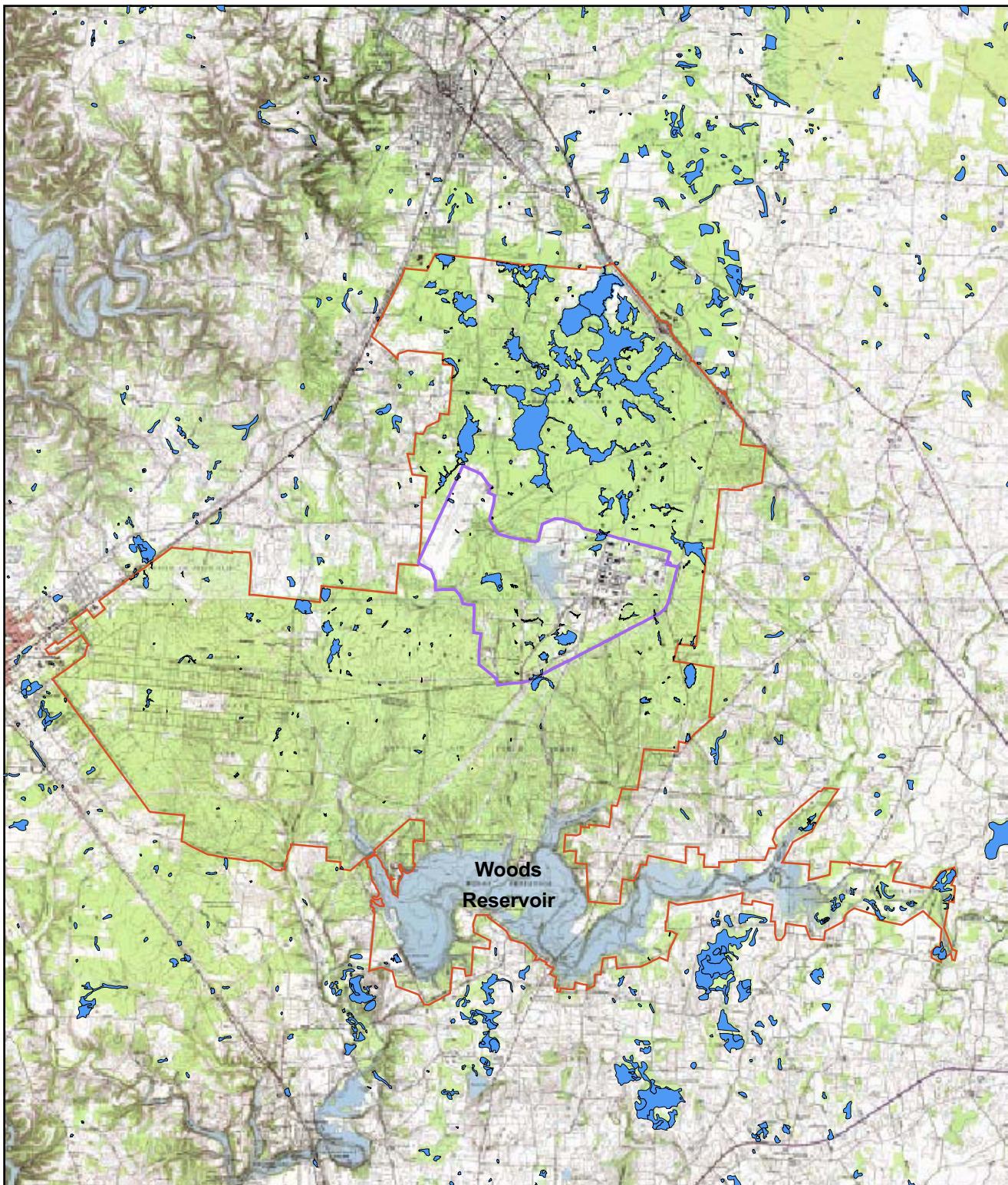
Wetland flats and depressions are the two primary wetland types on Arnold AFB. The USFWS completed a wetlands inventory and mapping project on Arnold AFB in 1998 and documented 1,894 acres of wetlands in 220 sites (Figure 3-3). Two hundred wetlands on Arnold AFB totaling about 1,775 acres are classified as either flats or depressions. At present, an interagency effort is underway to develop models, on the basis of hydrology and geomorphology, for assessing function in wetland flats and depressions. This and other ongoing projects would increase the understanding of how varying land uses in and adjacent to wetlands influence wetland function.

Wetlands at Arnold AFB result from three major geomorphic features: karst pans, compound sinks, and intermittent headwater streams (Call, 2003). Karst pans typically have depths less than 4.9 ft and level bottom topography. Compound sinks generally have depths greater than 8.2 ft and complex bottom topography dominated by internal drainage systems consisting of coalesced sinkholes and connecting channels.

Wetlands associated with headwater streams display a rapid surface water response to localized precipitation events. These areas remain wet for extended periods due to level topography and poorly drained soils. Hydrologic monitoring at Arnold AFB has identified distinct water regimes associated with karst pans and compound sinks.

Two karst pans, Tupelo Swamp and Goose Pond, have water regimes characterized by narrow ranges of flooding depth, gradual seasonal rises and recessions, long hydroperiods, persistent soil saturation, and perched surface water systems. These similarities persist across significantly different hydrologic conditions. Most pans on the Base support wet forests of willow oak, sweet gum, black tupelo, or red maple, but several support unusual natural communities that often include rare or disjunct plants and animals (Call, 2003).

Three compound sinks, Sinking Pond, Westall Swamp, and Willow Oak Swamp, share the geomorphic characteristics of about 9.8 ft of internal relief and plainly visible sinkhole drains. Their water regimes are characterized by abrupt seasonal rises and recessions, typically 6.6 ft or more during periods as short as 1 to 3 days, and close interactions between surface water and groundwater. These interactions include water table control of sinkhole drainage and very flashy groundwater response under the influence of concentrated recharge through the sinkholes. The annual flooding behavior of compound sinks is more sensitive to rainfall during the fall and early winter than to total annual rainfall (Call, 2003). Sinking Pond, designated a National Natural Landmark by the U.S. National Park Service, is well known locally for its abrupt seasonal flooding and draining. One of the most pristine areas at Arnold AFB, Sinking Pond also is the site of one of the largest great blue heron rookeries in Tennessee. The number of active great blue heron nests identified at Sinking Pond since 1965 is provided on Figure 3-4. Surveys were not conducted from 1989 through 1997.



0 7,500 15,000 Feet



LEGEND

- AEDC Boundary
- Arnold AFB Boundary
- Wetlands

Figure 3-3
Wetlands Located on Arnold Air Force Base
Invasive Pest Plant Management
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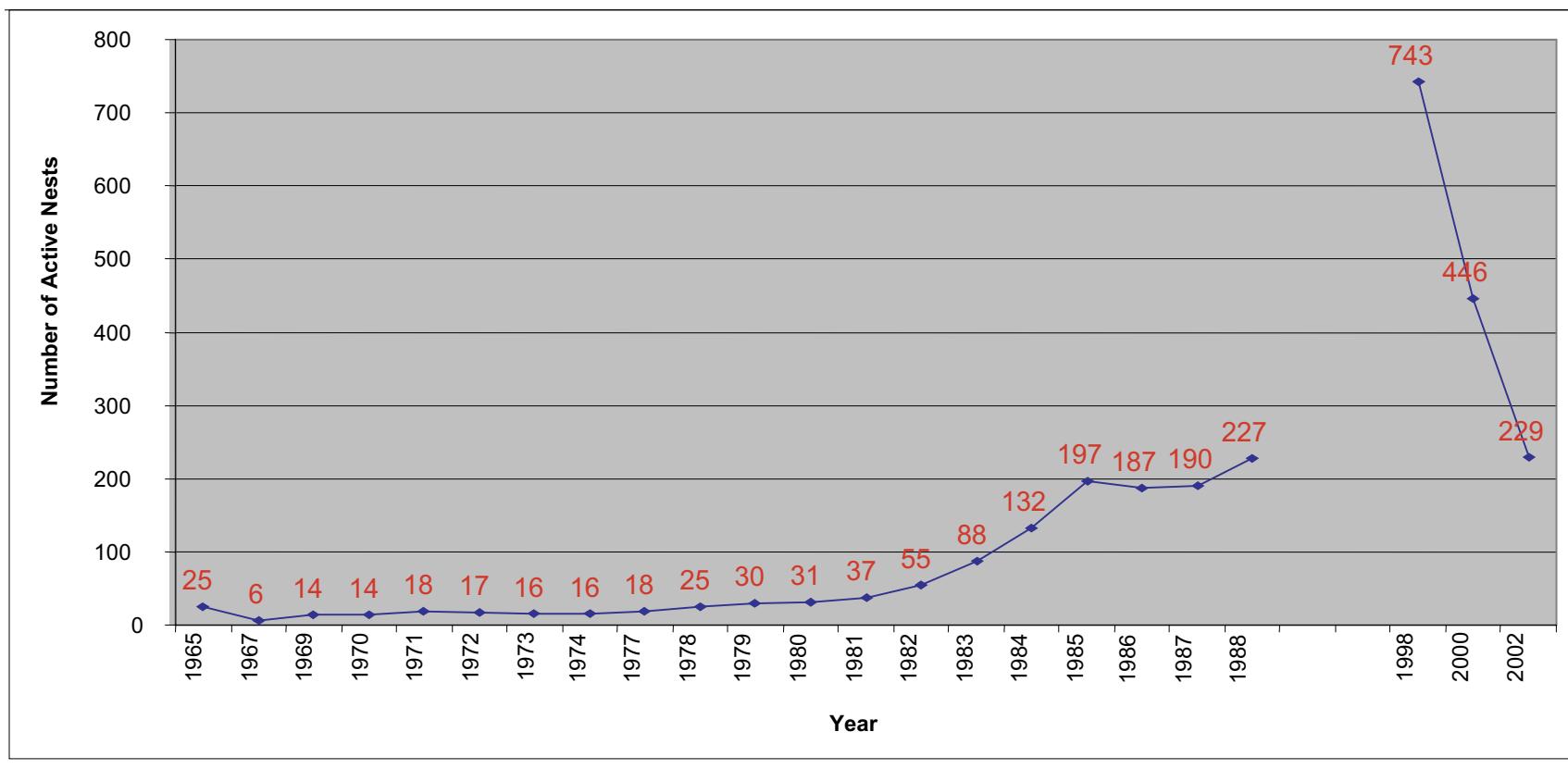


FIGURE 3-4
 Number of Great Blue Heron Nests Identified at Sinking Pond from 1965 through 2002
Invasive Pest Plant Management
Final Environmental Assessment

Data for 1965 through 1988 from Pullin (1980 and 1990). Data for 1998 from Carver et al. (1998). Data for 2000 and 2002 from J.W. Lamb (unpublished data).

According to the IEMP, 10 plant association communities identified as target conservation communities by the IPT are included in the wetland flats and depressions classification. The communities are listed in Appendix C.

Twenty-six species identified as target conservation species by the IPT are associated with wetland flats and depressions. The gopher frog (*Rana capito*) occurs in wetlands on Arnold AFB. However, the subspecific status of the gopher frog on Arnold AFB has not yet been determined. The Arnold AFB population of gopher frog is disjunct, separated from the nearest other population by several hundred miles and may represent a distinct, as yet undescribed, subspecies. The three subspecies of the gopher frog recognized in the scientific literature are considered species of concern by the USFWS. Many of the rare plants associated with the wetland flats and depressions classification also are disjunct populations of species whose central ranges are limited to the Atlantic or Gulf Coastal Plains. Several of the disjunct species associated with wetland flats and depressions are documented in Tennessee only from Arnold AFB. A list of all the conservation target species associated with wetlands on Arnold AFB and the wetland types in which they are typically found is provided in Appendix E.

3.4.5.2 Woodland/Savanna/Grassland Habitat

This classification represents a significant component of the Barrens mosaic, which historically characterized much of Arnold AFB and the landscape within which it is situated. The woodland and savanna components include lightly forested, oak-dominated habitats with a grass- and forb-dominated understory. Savannas are grasslands with a minor canopy cover, and woodlands are low-density forests with a well developed herbaceous understory. Fire exclusion since approximately the 1940s has led to the succession of most woodland and savanna habitats into forested habitats with shrub-dominated understories (e.g., some communities included in the upland dry-mesic forest described below). However, aerial photography from the late 1930s indicates that a woodland/savanna mosaic was a dominant habitat in the pre-military landscape on Arnold AFB.

Grasslands are the habitat most commonly described in the scientific literature regarding The Barrens of Tennessee. They probably occurred historically as scattered openings in the woodland/savanna mosaic, but also have undergone vegetative succession in the absence of wildfire across much of the landscape. The grasslands at Arnold AFB are dominated by grasses characteristic of tallgrass prairies in the midwestern United States and also include many wildflower and bird species associated with that region.

According to the IEMP (Call, 2003), seven vegetation communities identified as conservation targets by the IPT are included in the woodland/savanna/grassland classification (Appendix C). Their distributions are linked to ecological gradients that are influenced by soil series, moisture, disturbance, and topographic position, among other factors.

There are 18 species and 1 species guild identified as conservation targets by the IPT in woodland/ savanna/grassland habitats. The species are divided into two groups: one associated with dry sites and the other with mesic sites (Appendix F). Some of the

species may occur across the soil moisture gradient, but they are associated here with the habitat in which they are commonly found. Eggert's sunflower is the only federally listed (threatened) species associated with woodland/savanna/grassland. The guild identified for the classification is songbirds that utilize early successional habitats cited by Partners in Flight (Ford and Roedel, 1999). Species of concern include:

- Henslow's Sparrow (*Ammodramus henslowii*)
- Bachman's Sparrow (*Aimophila aestivalis*)
- Grasshopper Sparrow (*Ammodramus savannarum*)
- Blue-Winged Warbler (*Vermivora pinus*)
- Prairie Warbler (*Dendroica discolor*)
- Northern Bobwhite (*Colinus virginianus*)
- White-Eyed Vireo (*Vireo griseus*)

3.4.5.3 Upland Dry-Mesic Forests Habitat

The most prevalent habitat type on Arnold AFB lands is the upland forests that occupy most of the broad ridges and slopes on the Base. Portions of this forest type may present opportunities for restoring woodland or savanna communities, such as those that were present historically. However, the upland dry-mesic forests are also regionally important in their current condition, as large, contiguous forested tracts are uncommon in the southeastern portion of the Highland Rim physiographic province. The larger, mature forest tracts on Arnold AFB provide important breeding territory for interior forest songbirds and also help in many ways to maintain the function of nearby wetland habitats.

Five conservation target communities are included in the upland dry-mesic forest classification (Appendix C).

The upland dry-mesic forests collectively have focal conservation targets on Arnold AFB. Five community types are included in the upland dry-mesic forest classification:

- *Quercus falcata* - *Quercus coccinea* - *Quercus (stellata, velutina)/Vaccinium pallidum* Forest (Southern red oak – scarlet oak – post (black) oak/lowbush blueberry forest)
- *Quercus falcata* - *Quercus alba* - (*Quercus coccinea*)/*Oxydendrum arboreum/Vaccinium pallidum* Forest (Southern red oak – white (scarlet) oak/sourwood/lowbush blueberry forest)
- *Quercus alba* - *Quercus (falcata, stellata)/Chasmanthium laxum* Forest (White oak – southern red (post) oak/slender woodoats forest)
- *Juniperus virginiana* var. *virginiana* - *Quercus* spp. Forest (Eastern red cedar – oak forest)
- *Juniperus virginiana* var. *virginiana/Rhus copallinum/Schizachyrium scoparium* Forest (Eastern red cedar/winged sumac/little bluestem forest)

The single conservation target species guild identified is interior forest songbirds that require large (i.e., >500 acres) contiguous forest tracts for establishing breeding territories and includes:

- Wood Thrush (*Hylocichla mustelina*)
- Scarlet Tanager (*Piranga olivacea*)
- Ovenbird (*Seiurus aurocapillus*)

The original forest vegetation on Arnold AFB consisted of an oak-hickory forest type on the better-drained soils and a mixed bottomland hardwood type on the poorly drained soils. Historical timber harvest practices and the forest burning activities used to maintain woodland pasture for over 100 years have resulted in species composition of primarily blackjack oak, post oak, and scarlet oak on the poorer upland soils. The better stands of southern red oak, white oak, water oak, and willow oak occur on the wetter sites.

Pine is not native to this part of Tennessee but grows well on most sites in this area. Approximately 4,300 acres of pine were planted between 1950 and 1960 as part of a sound attenuation program designed to establish a noise barrier between Arnold AFB and the surrounding communities. Old fields and other areas that required little or no site preparation were planted with loblolly, shortleaf, white, and Virginia pines. An additional 1,400 acres were planted between 1960 and 1972. These plantings converted poor quality MUs of hardwood with low productivity into more productive loblolly pine. A pine reforestation program was initiated in 1983. The reforestation program re-establishes loblolly pine on pine sites where final harvests have been accomplished. During the early years of this reforestation effort, a few abandoned agricultural fields (less than 200 acres) were also converted to loblolly pine. Loblolly pine is used exclusively for the reforestation program because it has proven to grow better over a wide range of site classes.

3.5 Environmental Restoration Program and Hazardous Materials

Arnold AFB has an active ERP designed to protect human health and ensure that natural resources are restored for future use (CH2M HILL, 2002). Twenty-six ERP sites have been identified on Arnold AFB and 11 of these have been closed after determinations of no further action required.

Two Solid Waste Management Units (SWMUs) are located in or near areas where invasive pest plant management activities occurred, are planned, or could occur in the future. SWMU 24 encompasses the former Camp Forrest U.S. Army Base. SWMU 98 is the location of the former explosive ordnance disposal range.

3.5.1 SWMU 24

SWMU 24 is approximately 5,000 acres in size and encompasses 85 separate potential contaminant source areas. These source areas are former gas stations, motor pools, vehicle maintenance areas, warehouses, fuel storage and distribution areas, a coal pile, an incinerator, and two landfills. These sites were active between 1941 and 1946, when Camp Forrest was decommissioned and dismantled. Most of SWMU 24 is now overgrown with vegetation. Current uses include forestry, wildlife management, and recreation.

Sites with the potential for contamination within SWMU 24 were evaluated from 1999 to 2004. During the Confirmatory Sampling Program, organic chemicals were found in low concentrations at some sites. These include xylene, ethylbenzene, pesticides, acetone, and phthalates. Arsenic or other metals slightly above background levels were also detected at some sites. Sixteen of the 85 sites were then investigated in a RCRA Facility Investigation (RFI). Seven of the former fuel handling sites were found to have surface soils with contaminants exceeding USEPA human health or ecological screening levels, primarily polycyclic aromatic hydrocarbons (PAHs) and lead. The two former landfills and the former incinerator also had surface soil contamination exceeding screening levels, including semivolatile organic compounds (SVOCs), metals, pesticides, PCBs, and dioxins. Former Landfill 1 and the former incinerator are the two areas with the highest levels of surface soil contamination. The incinerator is located on a 1-acre site in the northeastern corner of Camp Forrest in Area A, on Road 14. The landfill is adjacent to the incinerator and encompasses approximately 17 acres. A fence around the incinerator and landfill restricts access to those properties (CH2M HILL, 2004a).

3.5.2 SWMU 98

SWMU 98 is an open grass field approximately 10 acres in size located 1,600 feet south-southwest of the Base airstrip. An investigation of the site was completed in 2004. It resulted in the removal of 692 pieces of ordnance explosive, ordnance-related scrap, and unrelated scrap. Data collected on soils during that investigation indicate that VOCs and perchlorate were present, but at concentrations that do not pose a contact risk or risk to groundwater. Metals (i.e. arsenic, cadmium, chromium, and zinc) were detected above USEPA screening values in one sediment sample collected from a drainage ditch, but they were not considered to pose a risk to aquatic organisms (CH2M HILL, 2004b).

4.0 Environmental Consequences

4.1 Occupational Health and Safety

As a result of the Arnold AFB mission, safety is a major concern. The 2003 Annual Report indicates that safety and environmental excellence are among the main focus areas.

4.1.1 Proposed Action

Proper use of equipment and chemicals involved with IPP management is critical to maintaining the safety of personnel involved with controlling the exotic species. JSAs have been developed for operation of manual control mechanisms (mowers, chain saws, etc.), and personnel are required to implement the controls and precautions specified in the JSAs. In addition, proper PPE (respirators, gloves, goggles, etc.) is required for all activities. Because of these measures, occupational health and safety risks are expected to be minimal during IPP management events.

4.1.2 No-Action Alternative

There would be no IPP management under the No-Action Alternative and no subsequent occupational health and safety concerns.

4.2 Hazardous Materials

4.2.1 Proposed Action

Herbicides could be considered hazardous materials. In the event of a spill, the Base hazardous materials team may be mobilized to control problems resulting from the spill.

4.2.2 No-Action Alternative

There would be no IPP management and no associated use of herbicide resulting from implementation of the No-Action Alternative. Therefore, the No-Action Alternative would have no impacts associated with hazardous materials.

4.3 Water Quality

The potential for adverse effects to water quality would exist due to the proposed IPP management activities. The TDEC 305(b) Report concludes that forestry operations do not contribute significantly to soil erosion and water pollution in Tennessee. The use of heavy equipment and herbicide application could create areas where transport can occur downslope, into immediately adjacent waters. Impacts to waters could result from:

- Herbicides - chemicals used to control undesirable insects, disease, vegetation, animals, or other life forms. If used incorrectly, or if spills or accidents were to occur, herbicides could be released into the environment in quantities that are toxic to a broad range of aquatic plants and animals.
- Vehicle Fluids - improper fueling and maintenance of vehicles can result in the introduction of petroleum products into waterways.

4.3.1 Proposed Action

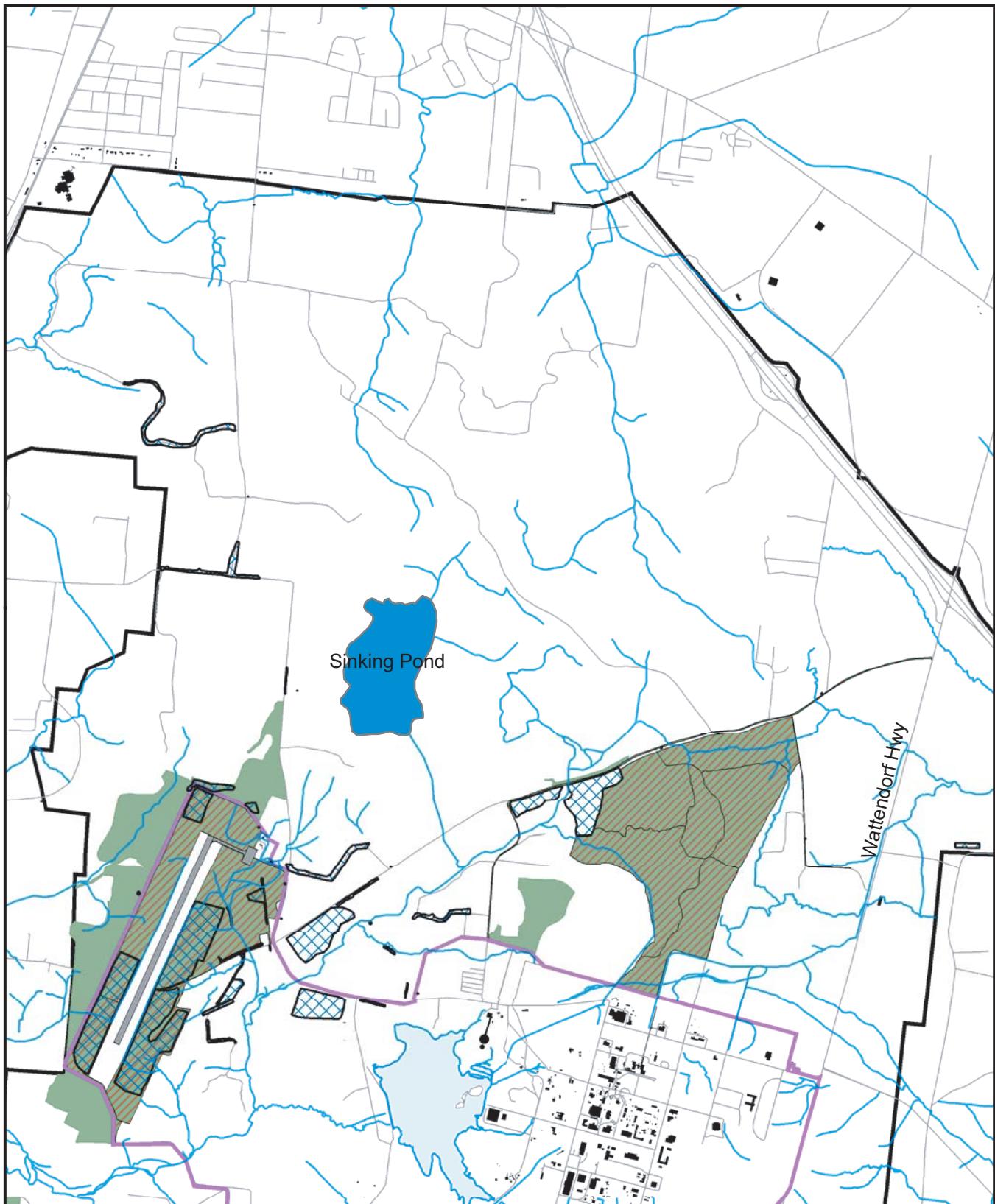
Figures 4-1 through 4-3 identify the IPP management areas and adjacent wetlands and streams. Potential impacts to waters would be limited to those resulting from herbicides and associated surfactants or vehicle lubricants and fuels.

Herbicides would be used to implement the Proposed Action. The herbicide applicator would follow all procedures to prevent runoff of chemicals to waters. When working in aquatic systems or streamside management zones (SMZs), the applicator would use only chemicals approved for use in aquatic areas. Triclopyr butoxyethyl ester, metsulfuron-methyl, clopyralid, and imazapic are water-soluble and may persist in water. These compounds would be hand-applied only in areas near waters to minimize the potential for accidental entry into surface waters. Material Safety Data Sheets (MSDSs) are provided in Appendix G.

No wetlands in the northern portion of the Base are scheduled for IPP management activities in FY 2005 and 2006 (Figure 4-1). One wetland in the eastern portion of the Base north of Woods Reservoir is in an area where manual removal of IPP species is proposed in FY 2005 and 2006 (Figure 4-2). Several small wetlands in the western portion of the Base are within areas scheduled for chemical control of IPPs in FY 2005 and 2006 (Figure 4-3).

Several small tributaries in the northern portion of the Base near the airfield and in the western portion of the Base are in areas where manual and chemical control of IPP species is proposed for FY 2005 and 2006 (Figures 4-1 and 4-3). Two larger streams, both draining into Woods Reservoir, are in areas where manual and chemical control of IPP species is proposed for FY 2005 and 2006 (Figure 4-2).

Discharge of fuels and lubricants into waters of the State of Tennessee as part of equipment maintenance and refueling is a violation of the Tennessee Water Quality Control Act (TWQCA). Vehicle operation, refueling, and maintenance during IPP management activities would involve fuels and other petrochemicals that could impact water quality if released into the environment. However, proper procedures and Best Management Practices (BMPs) for operation, maintenance, and refueling of vehicles would be followed to minimize or avoid impacts to water quality from accidental spills. These procedures include keeping all vehicles and equipment in proper operating condition, conducting all refueling and maintenance activities more than 100 ft from intermittent or perennial streams or wetlands, and storing all fuels and lubricants in proper containers and cabinets more than 100 ft from any stream or wetland.



0 1,250 2,500 Feet

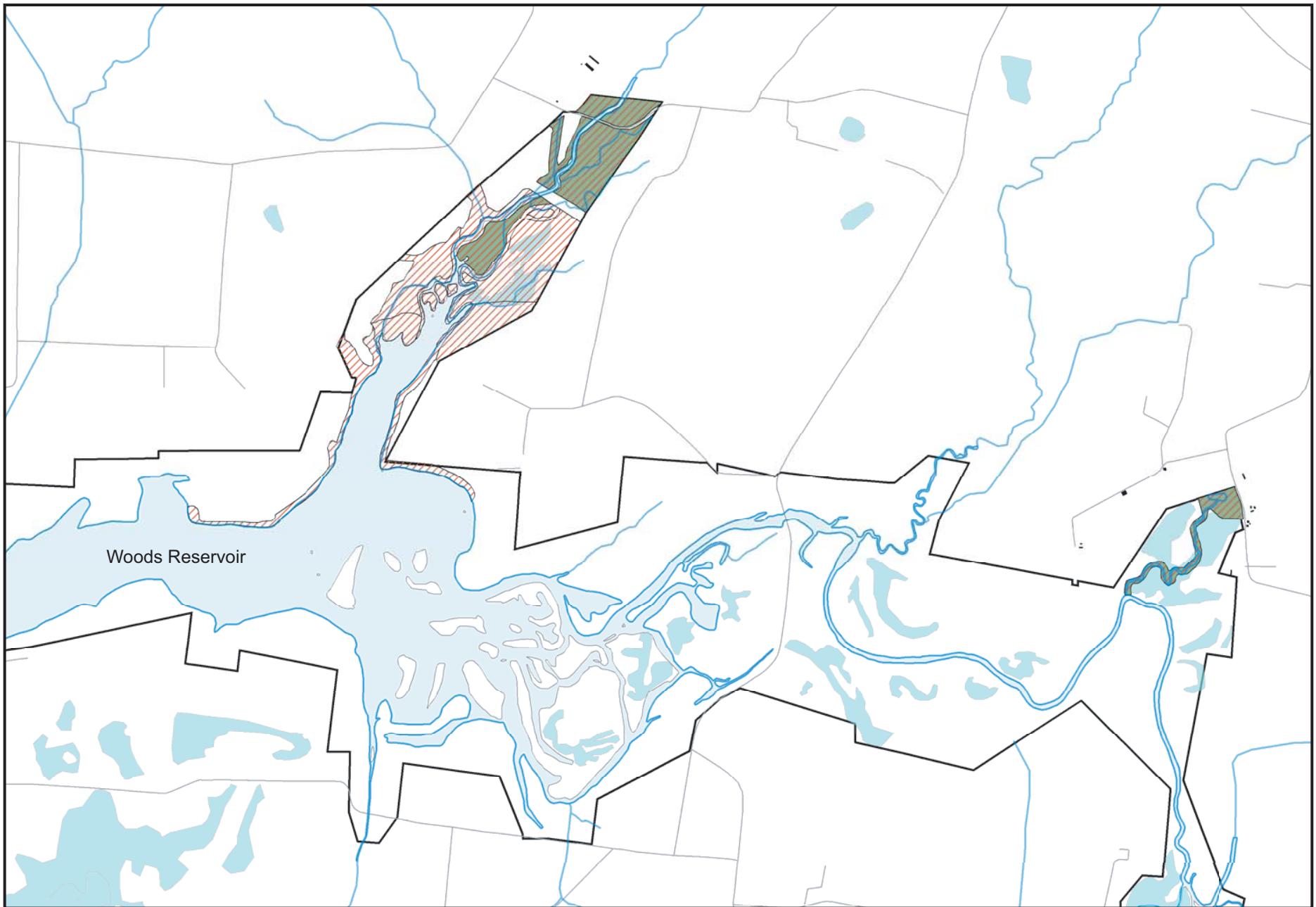


Legend

	Wetlands
	Streams
	Chemical Removal 2005-2006
	AEDC Boundary
	Manual Removal 2005-2006
	Road Centerline
	Buildings
	Reservoirs
	Arnold AFB Boundary
	Airfield



Figure 4-1
Wetlands, Streams, and IPP Management Areas—Northern
Invasive Pest Plant Management
Final Environmental Assessment



Legend

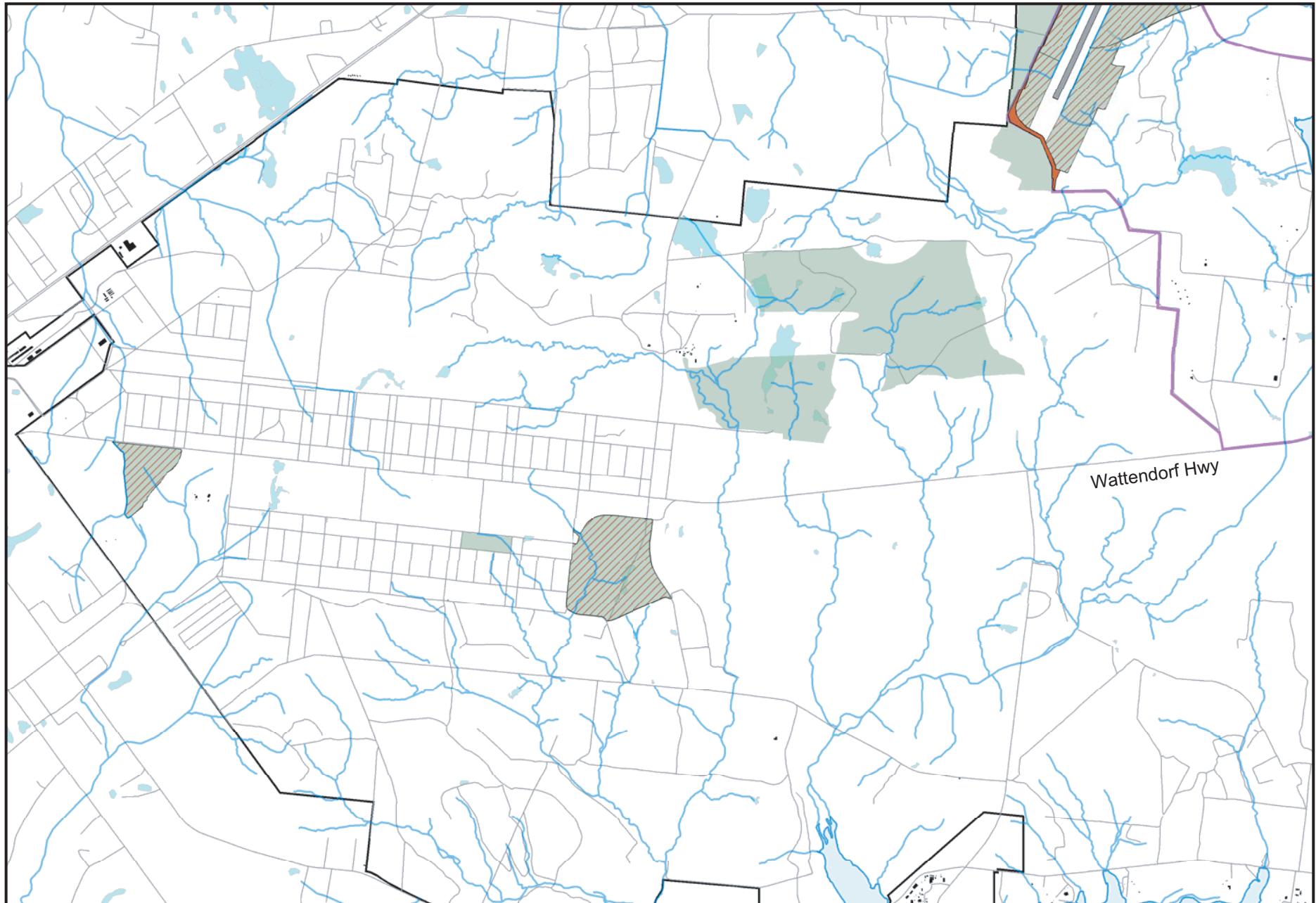
Wetlands	Road Centerline
Streams	Buildings
Chemical Removal 2005-2006	Reservoirs
Manual Removal 2005-2006	Arnold AFB Boundary

0 1,250 2,500 Feet



Figure 4-2
Wetlands, Streams, and IPP Management Areas—Eastern
*Invasive Pest Plant Management
Final Environmental Assessment*





Legend

Road Centerline	Wetlands
Streams	Buildings
Chemical Removal 2005-2006	Reservoirs
AEDC Boundary	Arnold AFB Boundary
Manual Removal 2005-2006	Airfield
Mowing 2005	

0 1,250 2,500
Feet



Figure 4-3
Wetlands, Streams, and IPP Management Areas—Western
Invasive Pest Plant Management
Final Environmental Assessment



4.3.2 No-Action Alternative

No IPP management or associated use of chemicals, fuels, and lubricants would occur with implementation of the No-Action Alternative. Therefore, the No-Action Alternative would have no impacts on water quality.

4.4 Biological Resources

Impacts would occur if proposed IPP management activities were to damage or kill an individual of a species, disturb or displace a species without causing harm, or alter habitat. This section examines potential impacts and discusses project design features that would be implemented to avoid or minimize impacts. Table 4-1 identifies the environmental risks associated with the herbicides used in the IPP program at Arnold AFB, and Table 4-2 identifies the herbicides used in each management unit. MSDSs for each compound are provided in Appendix G.

4.4.1 Non-Sensitive Species

4.4.1.1 Proposed Action

IPP management would result in a change in vegetative composition with the removal or reduction of populations of IPPs. Because the IPP management effort would be consistent with the IEMP and would be based on the FMP, the vegetation changes resulting from IPP removal are desirable.

Incidental injury or mortality of non-target plant species could result from windborne dispersion of herbicides. Proper techniques and application rates would minimize exposure of non-target plants to herbicides and minimize the potential for transport of herbicides into non-target areas and waters. Vegetative recovery through recolonization or regrowth following any accidental exposure would be expected to occur rapidly.

IPP management would likely cause temporary displacement of animal species during management activities. Animals would be expected to return to the IPP management areas after control efforts are complete. The compounds that would be used for chemical control have low toxicity to most animals (Table 4-1), and there would be minimal risk of toxic effects to animals because applicators would be required to follow appropriate application techniques.

For the reasons discussed above, any impacts to non-sensitive plant and animal species would be minor and temporary.

4.4.1.2 No-Action Alternative

Under the No-Action Alternative, no IPP management would occur. IPP species could become established, resulting in degradation of habitat quality on Arnold AFB. IPP populations would likely expand and colonize areas not currently inhabited by IPP species. Native vegetation would be expected to decline as IPP species displace them from additional areas. Habitat quality for animal species likely also would decline as native food and shelter plants were displaced.

TABLE 4-1
 Arnold AFB Herbicides – Toxicity and Persistence Data
Invasive Pest Plant Management Final Environmental Assessment

Compound (Trade Name)	Common Uses	General Toxicity	Birds	Aquatic Organisms	Insects	Soil Breakdown	Water Breakdown
Metsulfuron- methyl (Escort) ^a	Grains and pastures	No reproductive, teratogenic, mutagenic, or carcinogenic effects. Moderate eye irritant.	Low avian toxicity.	Toxic to fish and extremely toxic to aquatic algae, low toxicity to aquatic organisms.	Low acute toxicity to honey bees and earth-worms.	Half-life from 14 - 180 days, average of 30 days.	Half life is >84 days in high concentrations, 29.1 days at forestry use concentrations.
Clopyralid (Transline) ^b	Broadleaf plants	Substantial reproductive and teratogenic toxicity. Severely irritating to eyes	Data not available.	Low toxicity to fish and other aquatic organisms.	Toxic to ladybug, pirate bug, and lacewing.	Half-life from 15- 287 days.	Very soluble and mobile in water, persistent up to 30 days after treatment to 1.8 meters.
Triclopyr (Garlon 3A) ^a	Woody and broadleaf plants	Low risk of teratogenic effects and no mutagenic or carcinogenic effects. Considerable eye and skin irritant. Does not bioaccumulate.	Slightly toxic to birds.	Practically non- toxic to fish and other aquatic organisms.	Non-toxic to bees.	Half-life from 30 to 90 days, average of 46 days.	Photodegraded by sunlight. The half- life is 10 hours at 25° C.
Triclopyr (Garlon 4) ^a	Woody and broadleaf plants	Low risk of teratogenic effects and no mutagenic or carcinogenic effects. Minor eye and skin irritant. Does not bioaccumulate.	Slightly toxic to birds.	Toxic to fish and other aquatic organisms.	Non-toxic to bees.	Half-life from 30 to 90 days, average of 46 days.	Photodegraded by sunlight. The half- life is 10 hours at 25° C.
Imazapic (Plateau) ^c	broadleaf plants and grasses	Not considered carcinogenic. Minimal transient eye irritant. Does not bioaccumulate.	Low toxicity to birds	Non-toxic to fish and other aquatic organisms.	Non-toxic to insects.	Average Half-life 120 days.	Soluble, but not degraded in water. Rapidly photodegraded by sunlight. Half-life is 1-2 days.

^a Data from Extox (Extension Toxicology Network), Cornell University Pesticide Management Education Program. <http://pmep.cce.cornell.edu/profiles/extoxnet/index.html>; National Marine Fisheries Service, 2003; and MSDS.

^b Data from Clopyralid Fact Sheets: Prepared for the U.S. Department of Agriculture, Forest Service by Information Ventures, Inc. <http://infoventures.com/e-health/pesticide/choyrali.htm>; Clopyralid Fact Sheets: Caroline Cox / Journal of Pesticide Reform v.18, n.4, Winter98. <http://www.mindfully.org/Pesticide/Clopyralid.htm>; PAN Pesticides Database – Chemicals. http://www.pesticideinfo.org/Detail_Chemical.jsp?Rec_Id=PC36017; National Marine Fisheries Service, 2003; and MSDS.

^c Data from Weed Control Methods Handbook, The Nature Conservancy, <http://tncweeds.ucdavis.edu/> and MSDS.

TABLE 4-2
 Arnold AFB Management Units
Invasive Pest Plant Management Final Environmental Assessment

Management Unit	Target IPP	Herbicide Used	Size of Management Unit (Acres)
AFB001	Johnsongrass, Lespedeza	Plateau, Transline	149.8
AFB002	Fescue, Johnsongrass, Lespedeza, Tree of Heaven	Plateau, Plateau, Escort, Transline	118.1
AFB003	Johnsongrass, Lespedeza	Plateau, Escort	27.6
AFB004	Fescue, Johnsongrass, Lespedeza	Plateau, Plateau, Transline	53.1
AFB005	Fescue, Johnsongrass, Lespedeza	Plateau, Plateau, Transline	15.5
AFB010	Johnsongrass, Lespedeza	Plateau, Escort	49.5
DLC002	Autumn Olive	Garlon 3A	89.6
DLC003	Autumn Olive	Garlon 3A	38.6
DLC004	Autumn Olive, Tree of Heaven	Garlon 3A, Garlon 4	71.6
DLC005	Tree of Heaven	Garlon 4	81.0
DLC006	Tree of Heaven	Garlon 4	78.0
MAF001	Lespedeza	Transline	46.8
SWH001	Lespedeza	Transline	145.6
1701	Autumn Olive	Garlon 3A	5.1
3702	Fescue, Johnsongrass, Lespedeza	Plateau, Plateau, Garlon 4	8.7
3705	Fescue, Johnsongrass, Lespedeza	Plateau, Plateau, Escort	2.5
4120	Garlic Mustard	Garlon 3A	7.4
4121	Garlic Mustard	Garlon 3A	3.2
4253	Garlic Mustard	Garlon 3A	5.4
4255	Garlic Mustard, Privet, Trifoliate Orange	Garlon 3A, Garlon 3A, Garlon 3A	21.4
4256	Trifoliate Orange	Garlon 3A	10.2
4276	Garlic Mustard	Garlon 3A	11.0
4352	Garlic Mustard	Garlon 3A	3.1
4353	Garlic Mustard	Garlon 3A	0.7
4354	Garlic Mustard	Garlon 3A	5.2
7465	Kudzu	Transline	15.1
9120	Lespedeza	Transline	14.0
9121	Lespedeza	Transline	10.8
9123	Autumn Olive, Lespedeza	Garlon 3A, Transline	55.8
9251	Lespedeza	Transline	77.3
9252	Lespedeza	Transline	7.2
9254	Lespedeza	Transline	26.3

TABLE 4-2
 Arnold AFB Management Units
Invasive Pest Plant Management Final Environmental Assessment

Management Unit	Target IPP	Herbicide Used	Size of Management Unit (Acres)
9256	Lespedeza	Transline	24.5
9257	Lespedeza	Transline	14.1
9285	Tree of Heaven	Garlon 4	109.3
9287	Tree of Heaven	Garlon 4	131.8
9288	Tree of Heaven	Garlon 4	53.4
9298	Paulownia, Tree of Heaven	Garlon 4, Garlon 4	124.4
9706	Lespedeza	Transline	1.7

4.4.2 Sensitive Species

4.4.2.1 Proposed Action

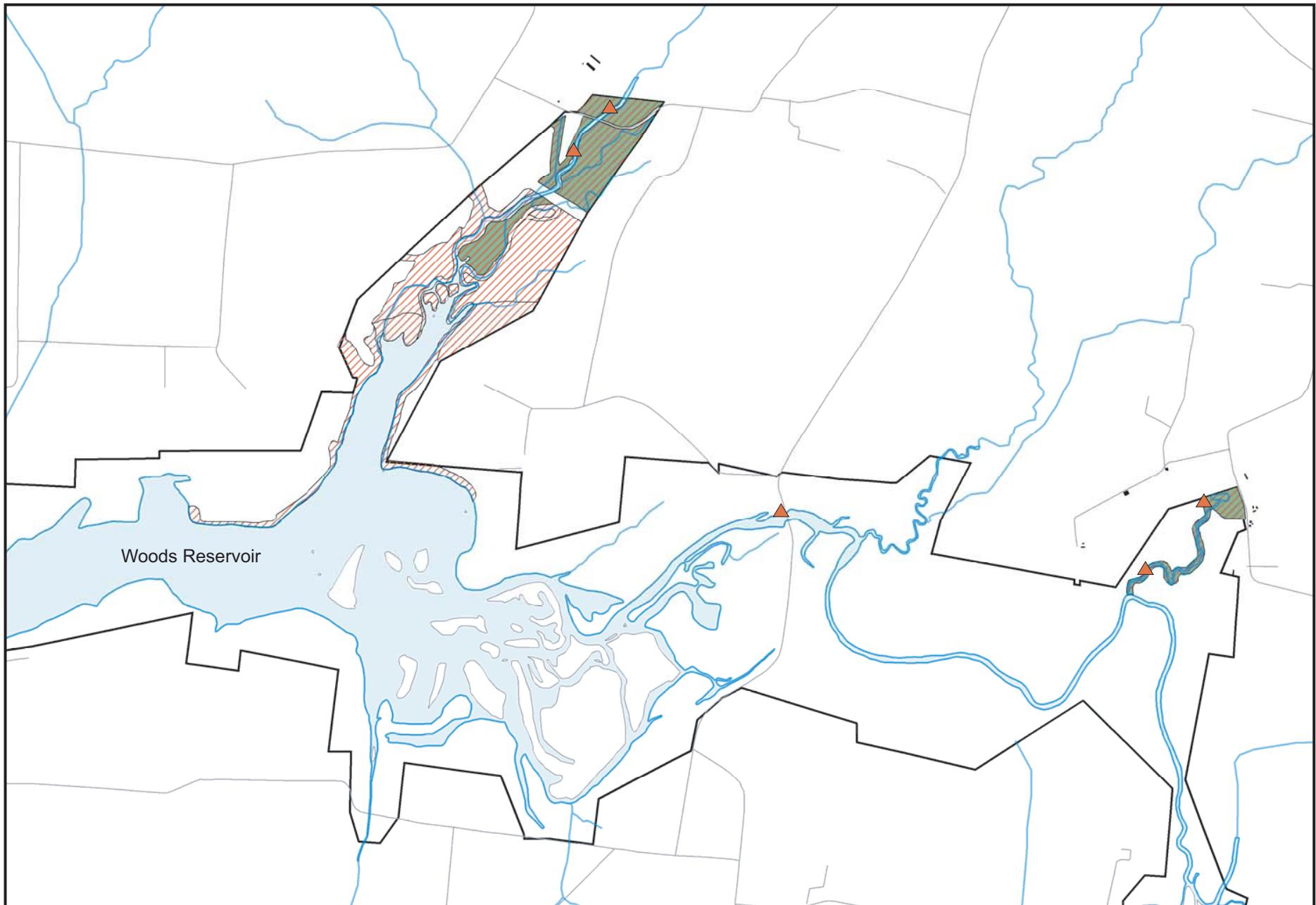
Gray Bat

Historically, gray bats have been observed in two areas scheduled for IPP management in FY 2005-2006 (Figures 4-4 and 4-5). These areas are located to the north and east of Woods Reservoir along tributaries that are proposed for chemical removal of IPPs. However, the lack of documentation on the use of other areas scheduled for IPP management does not necessarily indicate that gray bats do not use these areas.

The Proposed Action would not cause direct physical injury to gray bats, as no bats would be present in MUs during IPP control activities. Gray bats do not roost in trees, and they forage at night when IPP activities would have ceased.

Implementation of the control activities specified in the IPP Management Plan could result in localized reductions in gray bat prey base through toxicity to insect species. However, the compounds that would be used are generally non-toxic or of low toxicity to insects (Table 4-1). Additionally, areas of chemical application are relatively small compared to the amount of foraging habitat available on the Base, and most IPP control efforts would occur in habitats that are not primary foraging areas for gray bats. Indirect positive effects to gray bats could occur. For example, elimination or control of IPP species could allow greater productivity by native vegetation, potentially improving the prey base for gray bats.

The Woods Reservoir Dam is the site of a gray bat maternity colony and a gray bat bachelor colony. No IPP management would occur at the dam site. Therefore, no impacts to the maternity colony or the bachelor colony are expected from implementation of the Proposed Action. For the reasons stated above, only inconsequential direct or indirect impacts to gray bats would occur from implementation of the Proposed Action.



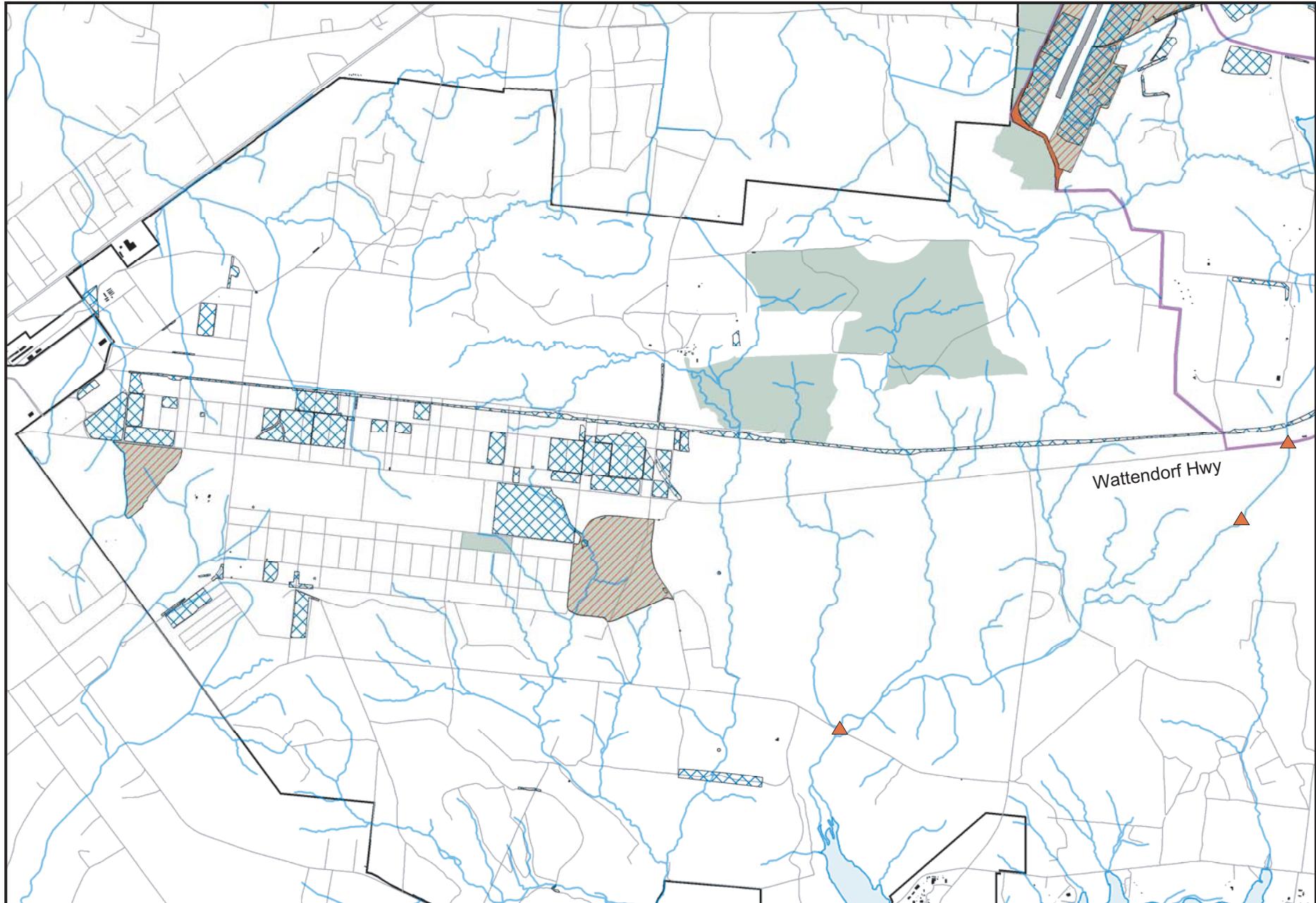
Legend

- ▲ Gray Bat Occurrences
- Streams
- Chemical Removal 2005-2006
- ▨ Manual Removal 2005-2006
- Road Centerline
- Buildings
- Reservoirs
- Arnold AFB Boundary

0 1,250 2,500 Feet



Figure 4-4
Sensitive Species and IPP Management Areas—Eastern
Invasive Pest Plant Management
Final Environmental Assessment



Legend

- Mowing 2005
- Streams
- Chemical Removal 2005-2006
- AEDC Boundary
- Manual Removal 2005-2006
- Airfield
- Eggert's Sunflower Occurrences
- Road Centerline
- Buildings
- Reservoirs
- Arnold AFB Boundary
- Gray Bat Occurrences

0 1,250 2,500 Feet



Figure 4-5
Sensitive Species and IPP Management Areas—Western
 Invasive Pest Plant Management
 Final Environmental Assessment

Indiana Bat

In 2003, AnaBat II™ surveys detected the possible presence of Indiana bats on Arnold AFB (Lamb, 2004b). However, the species has never been captured in mist net surveys on the Base. While the status of occurrence of the Indiana bat on Arnold AFB is uncertain, it is unlikely that the Proposed Action would negatively impact the species. It is also unlikely that the Proposed Action would cause direct physical injury to individual Indiana bats, as the bats would not come into direct contact with chemicals used for control and they would avoid areas where physical removal of vegetation was occurring. Indirect effects through modification of prey base, similar to those described for gray bats, could occur.

For the reasons stated above, only inconsequential direct or indirect impacts to Indiana bats are expected to result from implementation of the Proposed Action.

Bald Eagle

The bald eagle has been documented using the area around Woods Reservoir but not in areas proposed for IPP management. Bald eagles do not nest on Arnold AFB and are capable of leaving the immediate area of a disturbance. Chemicals used for IPP control on Arnold AFB do not bioaccumulate through aquatic food chains and would not be ingested by bald eagles through consumption of fish from Woods Reservoir. The herbicides metsulfuron-methyl (trade name Escort) and triclopyr (trade name Garlon 4) are toxic to fish (NMFS, 2003 and Garlon 4 MSDS). These chemicals would not be used near Woods Reservoir where accidental contamination that would adversely affect the prey base of bald eagles could occur. Therefore, no impacts to bald eagle on Arnold AFB are expected to result from the proposed IPP activities.

Eggert's Sunflower

Eggert's sunflower is widely distributed on Arnold AFB and occurs in the areas proposed for IPP management along the airfield in the northern portion of the Base (Figures 4-5 and 4-6). Manual and chemical removal of IPP species is proposed for these areas. IPP control efforts would be consistent with *AEDC Operational Information: Potential Impacts to Helianthus eggertii*, as discussed above. Procedures outlined in this document, which were developed in conjunction with USFWS, were designed to ensure that activities would not likely adversely affect the species. The species would be expected to more successfully propagate, resulting in an expanded population in response to the reduction in competitive exotics.

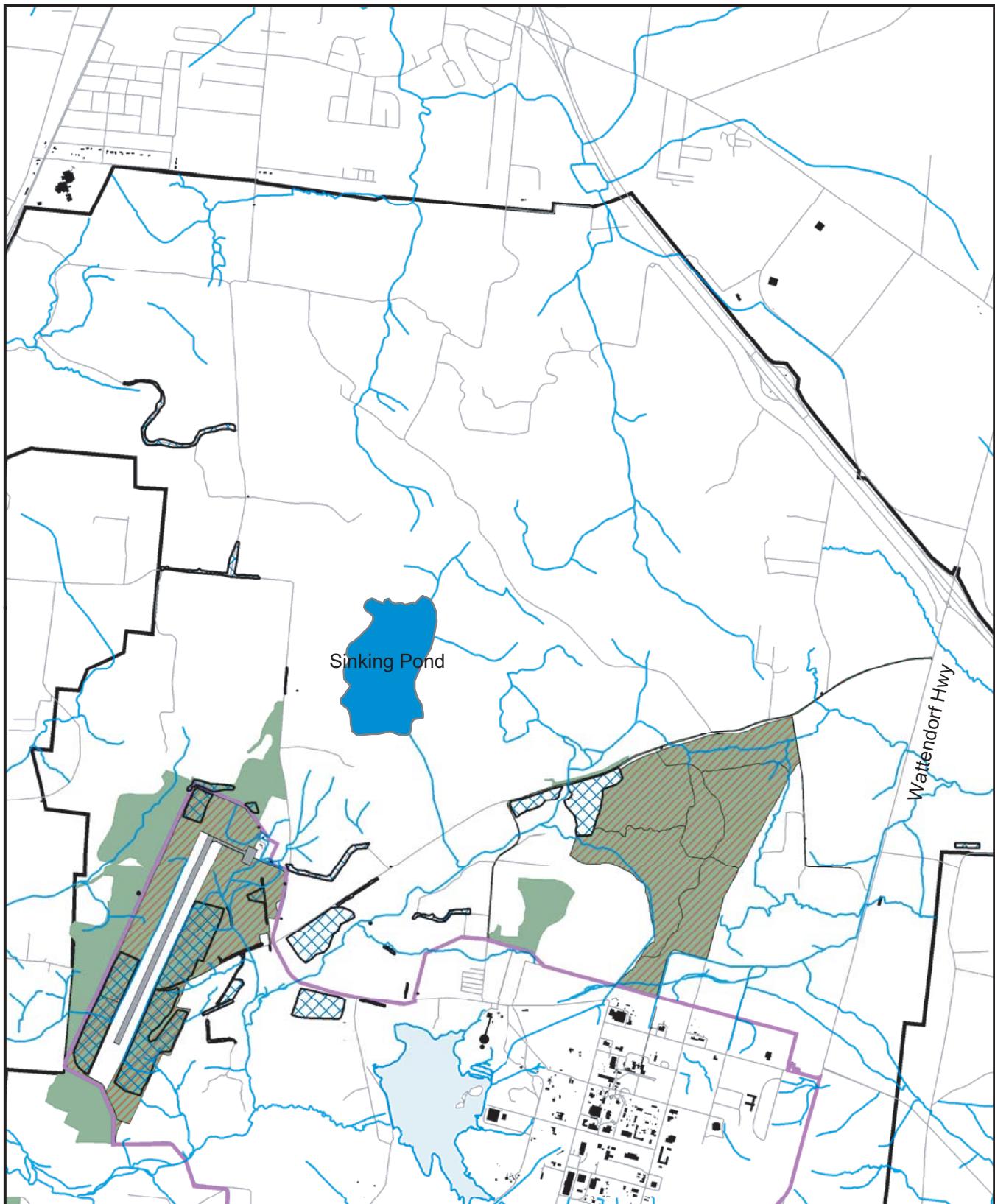
4.4.2.2 No-Action Alternative

Under the No-Action Alternative, no IPP management would occur. IPP species would continue to propagate in the management areas, resulting in increased competition and degradation of habitat occupied by Eggert's sunflower. IPP populations would likely expand and colonize areas not currently inhabited by IPP species. Native vegetation would be expected to decline as IPP species displace native plants.

4.4.3 Non-Sensitive Habitats

4.4.3.1 Proposed Action

Because the IPP management is consistent with the IEMP on Arnold AFB, the habitat changes resulting from IPP management are desirable. Elimination or reduction of populations of IPP species would allow more native vegetation to grow, thus enhancing overall habitat quality. Non-sensitive habitats would be expected to benefit from IPP control efforts.



Legend

- Streams
- Chemical Removal 2005-2006
- AEDC Boundary
- Manual Removal 2005-2006
- Airfield

- Eggert's Sunflower Occurrences
- Road Centerline
- Buildings
- Reservoirs
- Arnold AFB Boundary



Figure 4-6
Sensitive Species and IPP Management Areas—Northern
Invasive Pest Plant Management
Final Environmental Assessment

4.4.3.2 No-Action Alternative

Under the No-Action Alternative, no IPP management would occur. IPP species could become established, resulting in degradation of habitat quality on Arnold AFB. IPP populations would likely expand and colonize areas not currently inhabited by IPP species. Open habitats such as grasslands and savannas could shift to more shrub-dominated communities as IPP species expand. Forest understory and forest floor communities could experience a change in species and abundance.

4.4.4 Wetlands

IPP management efforts could impact wetlands through changes in species composition and changes in water quality.

4.4.4.1 Proposed Action

The Proposed Action includes several areas that are adjacent to or contain portions of forested wetlands and streams (Figures 4-1 through 4-3). As discussed above, no impacts to water quality are expected to result from implementation of the Proposed Action. Application techniques and appropriate chemicals would be used to avoid impacts to wetlands.

If it is necessary to spray near a wetland to control IPPs, all herbicide application would stop at the edge of the wetland and only herbicides that are approved for use near or in water (such as glyphosate) would be applied.

IPP management would detect new potential IPP problems through systematic inventory of MUs and control IPP species in areas where they are known to occur. This would result in maintaining greater habitat quality in wetlands through time.

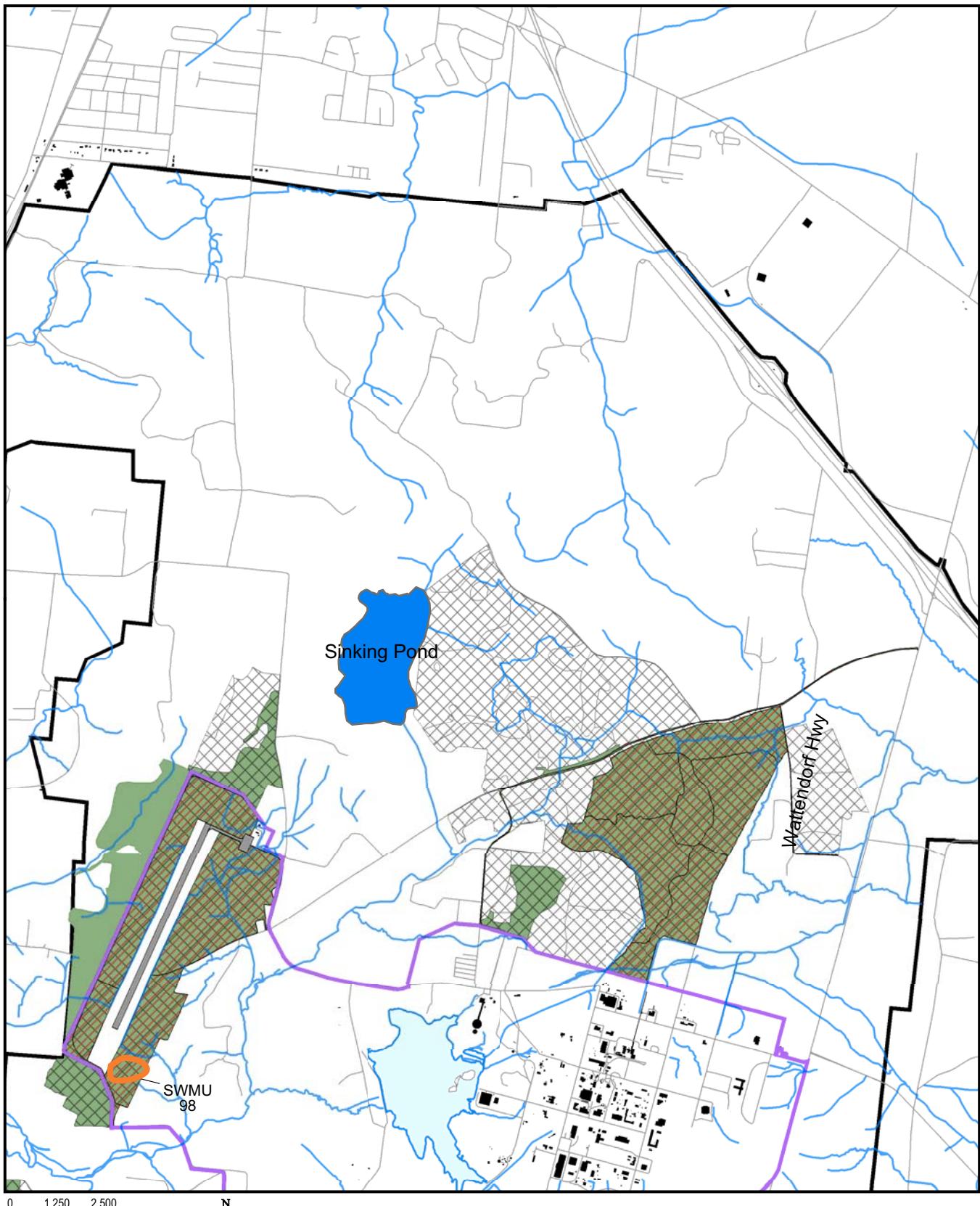
4.4.4.2 No-Action Alternative

Under the No-Action Alternative, no IPP management would occur. IPP species could become established in wetlands, resulting in degradation of habitat quality. Native wetlands plant species would be expected to decline, as would animals that use native species unless these animals could shift to other species to meet life history needs.

4.4.5 Upland Dry-Mesic Forests

4.4.5.1 Proposed Action

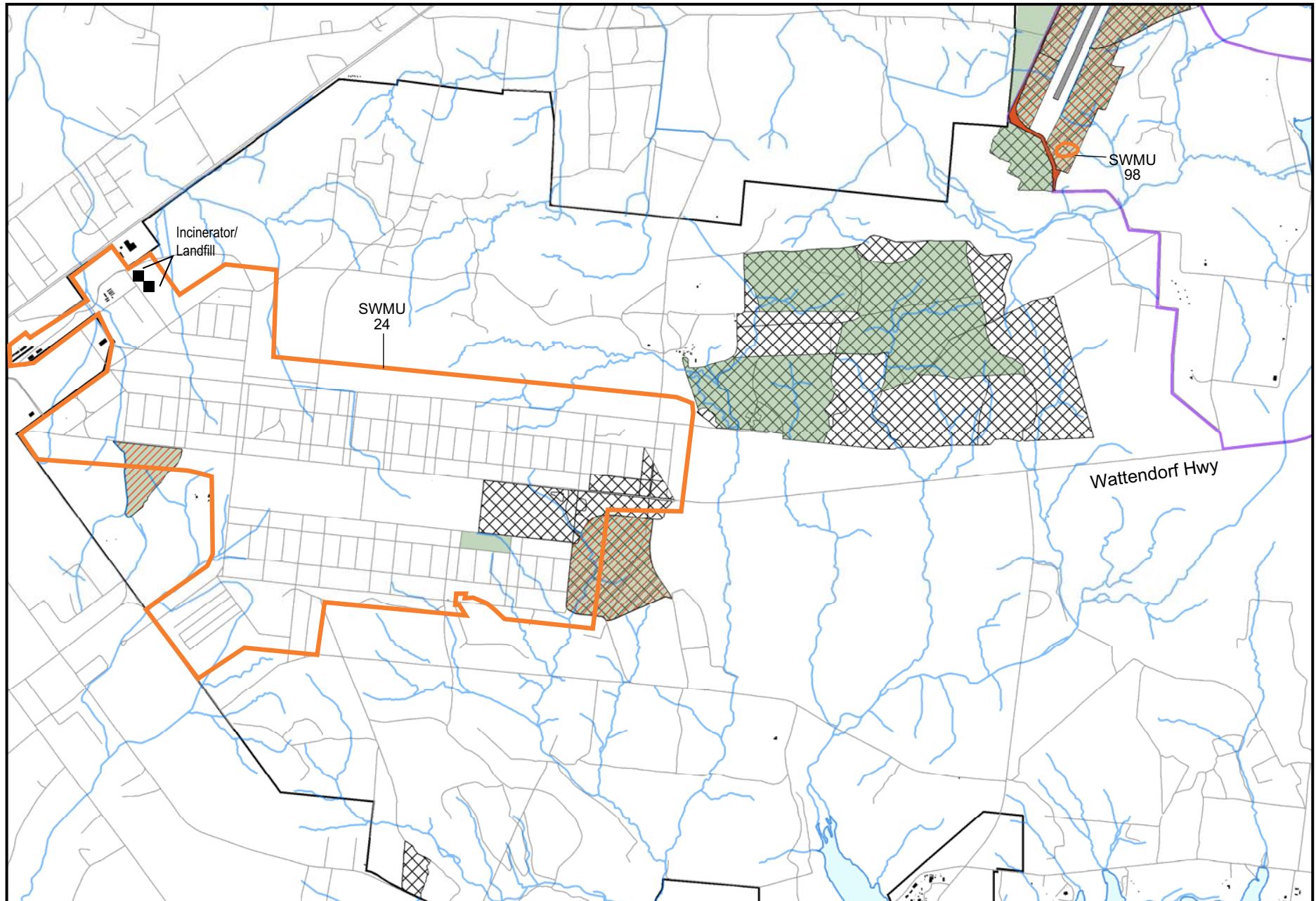
IPP management would detect new potential IPP problems through systematic inventory of MUs and control IPP species in areas where they are known to occur. This would result in maintaining greater habitat quality in upland dry-mesic forest areas through time. Implementation of the IPP Management Plan also would reduce or eliminate existing populations of IPP species in upland dry-mesic forest areas (Figures 4-7 and 4-8).



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Figure 4-7
Barrens Restoration and IPP Management Areas—Northern
Invasive Pest Plant Management
Final Environmental Assessment





Legend

Road Centerline	Barrens Restoration
Streams	
Chemical Removal 2005-2006	
AEDC Boundary	
Manual Removal 2005-2006	
Mowing 2005	
Buildings	
Reservoirs	
Arnold AFB Boundary	
Airfield	

0 1,250 2,500 Feet



Figure 4-8
Barrens Restoration and IPP Management Areas—Western
Invasive Pest Plant Management
Final Environmental Assessment

4.4.5.2 No-Action Alternative

Under the No-Action Alternative, no IPP management would occur. IPP species could become established in upland dry-mesic forests where they do not now occur or could increase in dominance in areas where they already are established. Native plant species would be expected to decline in response to the increase in IPP species. Without implementation of the IPP, it is highly unlikely that the goals of the IEMP would be met.

4.4.6 Woodland/Savanna/Grassland

4.4.6.1 Proposed Action

IPP management would detect new potential IPP problems through systematic inventory of MUs and control IPP species in areas where they are known to occur. This would result in greater habitat quality within woodlands/savanna/grasslands areas. Implementation of the IPP Management Plan also would reduce or eliminate existing populations of IPP species in woodlands/savanna/grasslands habitats. Implementation of the IPP Management Plan also would assist with restoration of the Barrens mosaic on Arnold AFB by eliminating or restricting the spread of IPP species (Figures 4-7 and 4-8).

4.4.6.2 No-Action Alternative

Under the No-Action Alternative, no IPP management would occur. IPP species could become established in woodlands/savanna/grasslands where they do not now occur or could increase in dominance in areas where they already are established. Native plant species would be expected to decline in response to the increase in IPP species. Without implementation of the IPP, it is highly unlikely that the goals of the IEMP would be met.

4.5 Environmental Restoration Program and Hazardous Materials

4.5.1 Proposed Action

ERP locations at Arnold AFB are shown on Figures 4-7 and 4-8. Invasive pest plant activities would be conducted within SWMU 98 and portions of SWMU 24. The surface soil contamination associated with SWMU 98 has been removed and the site no longer represents a human health or ecological risk. There would be no impact from invasive pest plant activities in this area.

The landfill and incinerator sites within SMWU 24 include metals, pesticides, PAHs, PCBs, and dioxins. These are sites that potentially have human health and ecological risk issues associated with activities occurring in those areas. Depending upon the species of plant, many of these compounds would not likely bioaccumulate in the vegetation from the soils through the roots (ATSDR, 1995; ATSDR, 2000; Extoxnet 2005). For other compounds, airborne sources could contribute more to bioaccumulation than the soil concentrations (Rideout et al., 2002). Dioxins present in soils could accumulate to some degree in the associated vegetation; however, this persistence is generally concentrated in the root and subsurface of the plants. Persistent organic pollutants from ambient air contribute to accumulation in plants, making soil contamination uptake difficult to ascertain (Rappolder et al., 2004). Certain species of plants could hyperaccumulate metals from soils (Lasat, 2005).

Even though the incinerator and landfill sites are located in SWMU 24, they would be outside of the areas planned for invasive pest plant control activities. Therefore, no impacts would occur from invasive pest plant management activities.

4.5.2 No-Action Alternative

No ERP sites would be impacted by the No-Action Alternative.

5.0 Plan, Permit, and Management Requirements

No permits are required for implementation of the Proposed Action. The contractor used for herbicide application must be certified by the State of Tennessee. The ATA IPP Manager who serves as the contract manager is also State-certified.

6.0 List of Preparers

CH2M HILL

Russell Short/Senior Project Manager/28 years of experience/Master of Arts

Rich Reaves/Environmental Scientist/9 years of experience/Ph.D.

Kira Zender, AICP/Senior Planner/9 years experience/Master of Arts

Jeremy Scott/Environmental Scientist/5 years of experience/Master of Science

Collin Horace/GIS Analyst/3 years of experience/Master of Science

David Dunagan/Technical Editor/26 years of experience/Master of Arts

7.0 List of Contacts

Richard McWhite, Civ AEDC/SED

Carrie Miller, Aerospace Testing Alliance Natural Resources

Steve Farrington, Aerospace Testing Alliance Natural Resources

Kevin Fitch, Aerospace Testing Alliance Natural Resources

Mark Moran, Aerospace Testing Alliance Natural Resources

8.0 References

ACS Conservation. 2003. Two-Year Forest Management Plan 2004-2005. Environmental Management, Arnold Engineering Development Center, Arnold Air Force Base, Tennessee.

ATSDR. 2000. Toxicological profile for polychlorinated biphenyls (PCBs). U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry.

ATSDR. 1995. Toxicological profile for polycyclic aromatic hydrocarbons. U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry.

Bailey, M., K. Bailey, J. Holmes, G. Gerald, and CH2MHILL. 2003. Northern pine snake (*Pituophis melanoleucus melanoleucus*) ecological assessment on Arnold Air Force Base, Tennessee. Technical report prepared for Arnold Engineering Development Center.

Call, G. 2003. Integrated Ecosystem Management Plan - Protecting, restoring, and managing using the principles of Ecosystem Management. Arnold Engineering Development Center, Arnold Air Force Base, Tennessee. ACS, Environmental Services, Conservation. September 2003.

Carver, B.D., J. W. Lamb, L Jennings, R. Moore, and G. West. 1998. Great blue heron colony status and nest site characteristics at Sinking Pond, Tennessee. *The Migrant* 69(4): 176-178.

CH2M HILL. 2002. Land Use Characterization: Final Report. Arnold Engineering Development Center, Arnold Air Force Base, Tennessee.

CH2M HILL. 2004a. RCRA Facility Investigation Supplement SWMU 98. Arnold Engineering Development Center, Arnold Air Force Base, Tennessee.

CH2M HILL. 2004b. Draft SWMU 24 RCRA Facility Investigation Report. Arnold Engineering Development Center, Arnold Air Force Base, Tennessee.

Extoxnet. Extension Toxicology Network. <http://extoxnet.orst.edu/pips/ddt.htm>. Accessed 17 January 2005.

Fitch, K. 2003. Eggert's Sunflower Management Plan for Arnold Air Force Base. Environmental Management, Arnold Engineering Development Center, Arnold Air Force Base, Tennessee.

Ford, R.P. and M.D. Roedel. 1999. Bird Conservation Planning in the Interior Low Plateaus. In Bonney, R., D.N. Pashley, R.J. Cooper, and L. Niles, eds. 1999. Strategies for Bird Conservation: The Partners in Flight Planning Process. Cornell Lab of Ornithology.

Lamb, J.W. Annual Report For Partners In Flight Point Counts (A.3018) Arnold Air Force Base/Arnold Engineering Development Center (AEDC). Technical report prepared for Arnold Engineering Development Center. 1999.

Lamb, J.W. Annual Report For Partners In Flight Point Counts (A.3018) Arnold Air Force Base/Arnold Engineering Development Center (AEDC). Technical report prepared for Arnold Engineering Development Center. 2000.

Lamb, J.W. Annual Report For Partners In Flight Point Counts (A.3018) Arnold Air Force Base/Arnold Engineering Development Center (AEDC). Technical report prepared for Arnold Engineering Development Center. 2001.

Lamb, J.W. Annual Report For Partners In Flight Point Counts (A.3018) Arnold Air Force Base/Arnold Engineering Development Center (AEDC). Technical report prepared for Arnold Engineering Development Center. 2002.

Lamb, J.W. Annual Report For Partners In Flight Point Counts (A.3018) Arnold Air Force Base/Arnold Engineering Development Center (AEDC). Technical report prepared for Arnold Engineering Development Center. 2003a.

Lamb, J.W. Gray Bat Management Plan for Arnold Air Force Base. Environmental Management, Arnold Engineering Development Center, Arnold Air Force Base, Tennessee. 2003b.

Lamb, J.W. 2004a. Annual Report For Partners In Flight Point Counts (A.3018) Arnold Air Force Base/Arnold Engineering Development Center (AEDC). Technical report prepared for Arnold Engineering Development Center.

Lamb, J.W. 2004b. Baseline bat fauna inventory final report. Technical report prepared for Arnold Engineering Development Center.

Lasat, M. 2005. The use of plants for the removal of toxic metals from contaminated soil. American Association for the Advancement of Science. Environmental science and engineering fellow. <http://clu-in.org/download/remed/lasat.pdf>. Accessed 18 January 2005.

McNab, W.H. and P.E. Avers. 1994. *Ecological Subregions of the United States*. Prepared in cooperation with Regional Compilers and the ECOMAP Team of the Forest Service. <http://www.fs.fed.us/land/pubs/ecoregions/index.html>

Miller, C. 2004. Invasive Pest Plant Management Plan. Arnold Engineering Development Center, Arnold Air Force Base, Tennessee.

Mullen, D., B. Miller, B. Cushing, J. Williams. 1995. An investigation and assessment of rare, threatened, and endangered fauna and their habitats on Arnold Air Force Base: invertebrates, fish, amphibians, reptiles, mammals, and birds. Technical report prepared for Arnold Engineering Development Center.

Murphy, T.M., F.M. Bagley, W. Dubuc, D. Mager, S.A. Nesbitt, W.B. Robertson, and B. Sanders. 1989. *The Southeastern States Bald Eagle Recovery Plan – Revision*. Region 4, U.S. Fish and Wildlife Service, Atlanta Georgia.

National Marine Fisheries Service (NMFS). 2003. Endangered Species Act Section 7 Consultation Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the U.S. Forest Service Noxious Weed Control Program in the Salmon River Drainage of Idaho, Valley, Adams, and Custer Counties, Idaho. NMFS Tracking No.: 2001/01363.

Pullin, P. P. 1980. Nest distribution the sinking pond colony. A report to the Tennessee Valley Authority.

Pullin, P. P. 1990. Size and trends of wading bird populations in Tennessee during 1977-1988. *The Migrant* 61(4): 95-104.

Rappolder M., C. Schroeter-Kermani, U. Waller, W. Koerner. Retrospective Monitoring of PCDDs, PCDFs, and PCBs in Pine- and Spruce-Shoots – Results from the German Environmental Specimen Bank. Dioxin Symposium 2004. Website: <http://dioxin2004.abstract-management.de/overview/s120.htm>. Accessed January 17, 2004.

Rideout, K., K. Teschkel, S. Varughese. 2002. Potential for Exposure to Polychlorinated Dibenzo-p-dioxins and Dibenzofurans when Recycling Sewage Biosolids on Agricultural Land. British Columbia Ministry of Water, Land and Air Protection Environment, Canada.

Roberts, T.H., M.S. Peterson, and CH2M HILL. 2001. Wetland fauna and drainage basin studies: spatial aspects of habitat use by birds in and around forested depressional and flats wetlands. Prepared for Arnold Engineering Development Center, Arnold Air Force Base, Tennessee.

Rommé, R.C. and R.P. Reaves. 1999. Fort Leonard Wood Endangered Species Management Plan for the Indiana Bat (*Myotis sodalis*), Gray Bat (*Myotis grisescens*), and Bald Eagle (*Haliaeetus leucocephalus*). Directorate of Public Works, Fort Leonard Wood Energy, Environment and Natural Resources Division.

Strohmeier, C. 2003. Arnold Air Force Base Barrens Management Plan Annual Update. Environmental Management, Arnold Engineering Development Center, Arnold Air Force Base, Tennessee.

Tennessee Department of Environment and Conservation, Division of Water Supply. 2002. Tennessee Ground Water Report, 305(b) Water Quality Report, November 2002.

Tennessee Wildlife Resources Agency (TWRA). 2004. Eagle Count Scheduled for January. <http://www.state.tn.us/twra/eaglecount.html>.

USEPA. 2004. Section 303(d) List Fact Sheet for Watershed Upper Elk. February 2004. http://oaspub.epa.gov/pls/tmdl/huc_rept.control?p_huc=06030003&p_huc_desc=UPPER%20ELK.

Whitaker, J.O., Jr. and W.H. Hamilton, Jr. 1998. Mammals of the Eastern United States. Comstock Publishing Associates. Ithaca, New York. 583 pp.

White, D. L. and J. A. Ratzlaff. 2000. Recovery plan for *Helianthus eggertii* Small (Eggert's sunflower). Region 4 U. S. Fish and Wildlife Service, Atlanta, Georgia.

Appendix A

Air Force Form 813

Environmental Impact Analysis: 000185 - Invasive Pest Plant Management on AAFB

From:Mark Moran

Proponent Org:ATA/SS43

Project:P00003452

Purpose And Need: Request approval of the invasive pest plant management program activities that are identified in the Two Year Conservation Management Plan for FY05-06.

Description And Alternative: See the attached document.

Air Installation Compatable Impact: No Effect **Status:**Closed

Air Quality Impact: No Effect **Status:**Closed

Water Resources Impact: No Effect **Status:**Closed

Safety And Occupational Health Impact: No Effect **Status:**Closed **Description:** Follow OSHA, AEDC standards and procedures.

Hazardous Materials Impact: No Effect **Status:**Closed **Description:** Provide MSDS for Herbicides.

Hazardous Waste Impact: No Effect **Status:**Closed

Biological Resources Impact: Positive Effect **Status:**Closed **Description:** Overall impact of this program should be positive in that it will allow for the control of exotic invasive pest plants and allow the development of more desirable vegetative communities. During control activities, all guides set in the Invasive Pest Plant Management Plan should be followed.

Cultural Resources Impact: No Effect **Status:**Closed

Geology And Soils Impact: No Effect **Status:**Closed

Socioeconomic Impact: No Effect **Status:**Closed

Installation Restoration Program Impact: Unknown Effect **Status:**Closed **Description:** Locations of activity not provided. Need to assess whether locations are on IRP sites. Invasive pest program does not affect IRP sites (per Dennis Flatt)

Other Impacts:

Remarks: Customer Need Date: 30-Jan-05

Determination: Further Environmental Analysis Required

Determination Justification:

AF 3 Letter Approval Signature ---- Richard McWhite **Comments** ---- Customer need date is 30 January 2005.

Environmental Planning Approval Signature ---- Philip Sherrill **Comments** ----

Environmental Final Approval Signature ---- Philip Sherrill **Comments** ----

Media Management Approval Signature ---- Pam King **Comments** ----

EIAP Approval Signature ---- Richard McWhite **Comments** ---- EA required.

SDE Director Approval Signature ---- Frank Duncan **Comments** ----

Appendix B

Job Safety Analysis for Invasive Pest Plant Control

PROJECT NAME		LOCATION	WORK ORDER NO.	
Invasive Plant Control				
<p>1. WRITE JOB/TASK IN THE SPACE PROVIDED AND DIVIDE THE TASK INTO INDIVIDUAL STEPS, AS APPROPRIATE.</p> <p>2. IN THE HAZARD COLUMN, LIST ALL POSSIBLE HAZARDS ANTICIPATED IN THE INDIVIDUAL STEP OF THE TASK OR JOB</p> <p>3. IN THE SAFE PLAN COLUMN, PROVIDE THE CORRECTIVE ACTIONS THAT WILL BE TAKEN TO PREVENT THE HAZARDS.</p> <p>4. IN THE RESOURCES COLUMN, LIST THE EQUIPMENT AND RESOURCES THAT ARE NEEDED TO ACHIEVE THE "SAFE PLAN."</p> <p>5. HAVE EACH TEAM MEMBER THAT HELPED DEVELOP THE JSA SIGN IN THE SPACES PROVIDED AT THE BOTTOM.</p>				
DESCRIBE JOB OR TASK				
In-house and Subcontractor support for Invasive Pest Plant Control				
STEP	DESCRIBE INDIVIDUAL TASK STEPS	HAZARD	SAFE PLAN	EQUIPMENT & RESOURCES
1	Loading and unloading ATV and other equipment	Ramps positioned incorrectly.	Verify placement and integrity of ramps.	
		Tie downs inadequate, allowing ATV to move on truck during transport.	Verify that tie downs are secure and adequate for the load.	
		Slips, trips, falls getting in/out of equipment.	Operator to request assistance getting in/out of equipment.	Additional personnel.
2	Inspect transport trucks	Insufficient capacity of truck	Check towing capacity of truck.	Vehicle operating manual.
		Defective tires, brakes, etc.	Visually inspect and verify PM.	
3	Fell trees, bucking logs or sawing limbs using a chainsaw.	Chainsaw operator not properly trained.	Ensure that chainsaw operator has had at least 1 hour training session covering equipment safety, use and maintenance, and has reviewed the National Safety Council pamphlet entitled "How To Improve Your Chainsaw Savvy"	Adequate training
		Chainsaw operator, cut, scraped, pinched or pinned from saw kickback, tree sliding off stump or tops/limbs falling from tree.	Provide additional personnel to spot for chainsaw operator, wear PPE, plan clear escape route before sawing, evaluate tree and plan for best direction to fall.	Additional personnel, PPE consisting of hardhat, safety goggles, earplugs, leather work gloves, safety toed boots, and Kevlar chaps.

PROJECT NAME		LOCATION	WORK ORDER NO.			
Invasive Plant Control						
1. WRITE JOB/TASK IN THE SPACE PROVIDED AND DIVIDE THE TASK INTO INDIVIDUAL STEPS, AS APPROPRIATE. 2. IN THE HAZARD COLUMN, LIST ALL POSSIBLE HAZARDS ANTICIPATED IN THE INDIVIDUAL STEP OF THE TASK OR JOB 3. IN THE SAFE PLAN COLUMN, PROVIDE THE CORRECTIVE ACTIONS THAT WILL BE TAKEN TO PREVENT THE HAZARDS. 4. IN THE RESOURCES COLUMN, LIST THE EQUIPMENT AND RESOURCES THAT ARE NEEDED TO ACHIEVE THE "SAFE PLAN." 5. HAVE EACH TEAM MEMBER THAT HELPED DEVELOP THE JSA SIGN IN THE SPACES PROVIDED AT THE BOTTOM.						
DESCRIBE JOB OR TASK						
In-house and Subcontractor support for Invasive Pest Plant Control						
STEP	DESCRIBE INDIVIDUAL TASK STEPS	HAZARD	SAFE PLAN	EQUIPMENT & RESOURCES		
4	Walking and cutting operations	Uneven ground, obstacles and slips, trips, and fall hazards	Inspect area to ensure path and footing is clear. Be aware of obstacles; look at entrance and exits to work area. If necessary clear area before working by hand. Ensure chainsaw is off when moving or walking around work area.	Observation, awareness of work area, heavy equipment to clear area before risking hand work.		
5	Equipment Condition	Worn or loose chains, sharp cut hazard, fuel flammable hazards	Perform pre operation inspection of equipment; have proper maintenance performed on equipment. Perform fueling only when machine is cool and off and avoid spillage.	Chainsaws maintained properly, proper fueling and maintenance procedures.		
6	Herbicide application	Proper licensing	Must be licensed by the state of Tennessee for herbicide application	Proper licensing and training		
		Contact with herbicide on skin and/or in eyes, nose, and mouth	Wear proper PPE for the herbicide in use. PPE is herbicide specific. Possible PPE: long pants, shirts, depending on herbicide Tyvek spray suit, gloves, respirator, and safety goggles.	First aid kit, emergency contacts, decontamination kit. Herbicide label, MSDS, safety goggles, respirator, eye wash kit, safe drinking water		
7	Cutting shrubs with hand tools	Cut from hand tools	Wear proper PPE	Gloves		
		Personnel injury while working alone.	Post a safety observer at site.	Radios, first aid kit.		
8	Hand Pulling	Personnel injury, possible back injury from bending or pulling	Use proper lifting techniques. Have proper equipment to reduce pressure on back	Weed Wrench, loppers, pruners		

PROJECT NAME		LOCATION	WORK ORDER NO.	
Invasive Plant Control				
<p>1. WRITE JOB/TASK IN THE SPACE PROVIDED AND DIVIDE THE TASK INTO INDIVIDUAL STEPS, AS APPROPRIATE.</p> <p>2. IN THE HAZARD COLUMN, LIST ALL POSSIBLE HAZARDS ANTICIPATED IN THE INDIVIDUAL STEP OF THE TASK OR JOB</p> <p>3. IN THE SAFE PLAN COLUMN, PROVIDE THE CORRECTIVE ACTIONS THAT WILL BE TAKEN TO PREVENT THE HAZARDS.</p> <p>4. IN THE RESOURCES COLUMN, LIST THE EQUIPMENT AND RESOURCES THAT ARE NEEDED TO ACHIEVE THE "SAFE PLAN."</p> <p>5. HAVE EACH TEAM MEMBER THAT HELPED DEVELOP THE JSA SIGN IN THE SPACES PROVIDED AT THE BOTTOM.</p>				
DESCRIBE JOB OR TASK				
In-house and Subcontractor support for Invasive Pest Plant Control				
STEP	DESCRIBE INDIVIDUAL TASK STEPS	HAZARD	SAFE PLAN	EQUIPMENT & RESOURCES
9	Communication	Lack of communication.	Ensure radio or cell phone is on jobsite at all times, with knowledge of emergency contacts.	Radios, cell phones, with charged batteries and extra batteries.
10	Nature	Snakes, spiders, bees, poison ivy, ticks (lyme disease)	Wear long pants and other appropriate clothing, insect repellant, fresh wash waster. Avoid exposure, check for ticks.	First aid kits, emergency contacts, insect repellant, fresh wash water, appropriate clothing, MSDS for insect repellent.
		Sunburn, heat stress/stroke, dehydration, hypothermia	Wear sun block and a hat (when necessary). Dress in layers to prepare for varying weather conditions. Wear rain gear when necessary. Drink plenty of water.	Personal clothing, rain gear, hats, and sun block. Fresh drinking water. PPE: waterproof boots (when necessary), appropriate clothing.

TASK TEAM MEMBERS
SUPERVISOR(S)

NAME PRINTED/SIGNATURE

NAME PRINTED/SIGNATURE

NAME PRINTED/SIGNATURE

NAME PRINTED/SIGNATURE

Appendix C

Plant Associations Occurring on Arnold Air Force Base

Forest

Planted/Cultivated

Pinus taeda Planted Forest

Natural

Upland Forest

Quercus falcata - *Quercus coccinea* - *Quercus (stellata, velutina)* / *Vaccinium pallidum* Forest

Quercus falcata - *Quercus alba* - (*Quercus coccinea*) / *Oxydendrum arboreum* / *Vaccinium pallidum* Forest

Quercus alba - *Quercus (falcata, stellata)* / *Chasmanthium laxum* Forest

Juniperus virginiana var. *virginiana* - *Quercus* spp. Forest

Juniperus virginiana var. *virginiana* / *Rhus copallina* / *Schizachyrium scoparium* Forest

Wetland Forest

***Quercus lyrata* / *Betula nigra* / *Pleopeltis polypodioides* Forest**

Quercus phellos - *Quercus alba* / *Vaccinium fuscum* - (*Viburnum nudum*) / *Carex (barrattii, intumescens)* Forest

Liquidambar styraciflua Forest

Quercus phellos - *Quercus nigra* - (*Nyssa biflora*) Forest

Nyssa aquatica / *Cephalanthus occidentalis* Forest

Floodplain - Floodplain Terrace / Bottomland Forest

Quercus alba - *Carya (alba, ovata)* - *Liriodendron tulipifera* -(*Quercus phellos*) / *Cornus florida* Forest

***Quercus nigra* - *Quercus (alba, phellos)* Forest**

Liquidambar styraciflua - *Quercus michauxii* - *Carya laciniosa* / *Fagus grandifolia* -(*Aesculus flava*) Forest

***Quercus velutina* - *Carya (alba, glabra)* / *Vaccinium arboreum* Forest**

Platanus occidentalis - (*Liquidambar styraciflua*, *Acer rubrum*) / (*Carpinus caroliniana*) / *Onoclea sensibilis* Forest

Salix nigra - *Acer (rubrum, saccharinum)* / *Alnus serrulata* - *Cephalanthus occidentalis* Forest

Woodland

Quercus (falcata, stellata) / *Quercus marilandica* / *Gaylussacia (baccata, dumosa)* Woodland

Quercus stellata - (*Quercus coccinea*) / *Quercus marilandica* / *Vaccinium pallidum* - (*Vaccinium stamineum*) Woodland

SHRUBLAND

Upland shrubland

Rubus (argutus, trivialis) - Smilax (glauca, rotundifolia) Shrubland

Wetland shrubland

Cephalanthus occidentalis - Hibiscus moscheutos ssp. moscheutos Shrubland

Herbaceous Vegetation

Upland Grassland

Andropogon gerardii - (Andropogon glomeratus, Panicum virgatum, Sorghastrum nutans)
Herbaceous Vegetation

Andropogon gerardii - Schizachyrium scoparium - (Calamagrostis coarctata, Panicum virgatum)
Herbaceous Vegetation

Schizachyrium scoparium - Andropogon (gyrans, ternarius, virginicus) Herbaceous Vegetation

Schizachyrium scoparium - Calamagrostis coarctata Herbaceous Vegetation

Andropogon virginicus var. virginicus Herbaceous Vegetation

Wetland Grassland

Juncus effusus Herbaceous Vegetation

Eleocharis microcarpa - Juncus repens - Rhynchospora corniculata - (Mecardonia acuminata - Proserpinaca spp) *Herbaceous Vegetation*

Panicum hemitomon - Dulichium arundinaceum Herbaceous Vegetation

Saccharum baldwinii - Calamagrostis coarctata - Panicum rigidulum - Rhynchospora capitellata
Herbaceous Vegetation

Scirpus cyperinus - Panicum rigidulum var. elongatum - Rhynchospora corniculata *Herbaceous Vegetation*

Typha latifolia *Herbaceous Vegetation*

Wetland Perennial Forb

Pontederia cordata - Sagittaria graminea - Sagittaria latifolia Herbaceous Vegetation

Source: Call, 2003

Appendix D

Sensitive Species Known to Occur on Arnold Air Force Base

Plants		Designated Status		Rank	
Scientific Name	Common Name	Federal	Tennessee	Global	Tennessee
<i>Agalinis pseudophylla</i>	Shinner's false-foxglove	C2	E	G1G2Q	S1
<i>Carex barrattii</i>	Barratt's sedge		E	G4	S2
<i>Carex buxbaumii</i>	Brown bog sedge		S	G5	S1
<i>Clethra alnifolia</i>	Coastal sweet pepper-bush		T	G5	S1
<i>Cypripedium acaule</i>	Pink lady's-slipper		E-CE	G5	S4
<i>Cypripedium kentuckiense</i>	Kentucky lady's-slipper		E	G3	S1
<i>Panicum aciculare</i>	Needleleaf witchgrass		E	G4G5	S1
<i>Panicum ensifolium</i>	Small-leaved panic grass		S	G4	S1S2
<i>Panicum acuminatum</i> <i>leucothrix</i>	Roughish witchgrass		S	G4?Q	S1
<i>Drosera brevifolia</i>	Dwarf sundew		T	G5	S2
<i>Echinacea pallida</i>	Pale-purple coneflower		T	G4	S1
<i>Eleocharis intermedia</i>	Matted spike-rush		S	G5	S1
<i>Eupatorium leucolepis</i>	White-bracted thoroughwort		E	G5	S1
<i>Festuca paradoxa</i>	Cluster fescue		S	G5	S1
<i>Gaylussacia dumosa</i>	Dwarf huckleberry		T	G5	S3
<i>Gentiana puberulenta</i>	Prairie gentian		E	G4G5	S1
<i>Gymnopogon brevifolius</i>	Broad-leaved beardgrass		S	G5	S1S2
<i>Helianthemum propinquum</i>	Low frostweed		S	G4	S1
<i>Helianthus eggertii</i>	Eggert's sunflower	T C2	T	G3	S3
<i>Hypericum adpressum</i>	Creeping St. John's-wort		T-PE	G2G3	S1
<i>Iris prismatica</i>	Slender blue flag		T	G4G5	S2S3
<i>Isoetes melanopoda</i>	Blackfoot quillwort		E	G5	
<i>Juglans cinerea</i>	White walnut, butternut		T	G3G4	
<i>Lachnanthes caroliniana</i>	Carolina redroot	E	G4		
<i>Lechea pulchella</i>	Legget's pinweed		E	G5	
<i>Lespedeza angustifolia</i>	Narrowleaf bushclover		T	G5	
<i>Lilium michiganense</i>	Michigan lily		T	G5	
<i>Liparis loeselii</i>	Fen orchis		E-PT	G5	S1
<i>Listera australis</i>	Southern twayblade		E	G4	S1S2
<i>Lobelia canbyi</i>	Canby's lobelia		T	G4	S2S3
<i>Ludwigia sphaerocarpa</i>	Globe fruited false-loosestrife		T	G5	S2
<i>Lycopodiella alopecuroides</i>	Foxtail clubmoss		T	G5	S1
<i>Marshallia trinervia</i>	Broad-leaved Barbara'sbuttons		T	G3	S2
<i>Muhlenbergia glabriflora</i>	Hair grass		E	G4?	S1
<i>Muhlenbergia torreyana</i>	Torrey's dropseed		S	G3	S1
<i>Myriophyllum pinnatum</i>	Cutleaf water-milfoil		T	G5	S1
<i>Panicum acuminatum</i> var. <i>densiflorum</i>	Eaton's witchgrass		E	G5	S1
<i>Panicum hemitomon</i>	Maidencane		S	G5?	S2
<i>Platanthera integra</i>	Yellow fringeless orchid		E	G3G4	S2S

Plants		Designated Status		Rank	
Scientific Name	Common Name	Federal	Tennessee	Global	Tennessee
<i>Pogonia ophioglossoides</i>	Rose pogonia		E	G5	S2
<i>Polygala mariana</i>	Maryland milkwort		S	G5	S1
<i>Polygala nuttallii</i>	Nuttall's milkwort		E	G5	S1
<i>Prenanthes aspera</i>	Harsh rattlesnake-root		E	G4?	S1
<i>Prunus pumila</i>	Sand cherry		T	G5	S1
<i>Ranunculus flabellaris</i>	Yellow water crowfoot		T	G5	S2
<i>Rhyncospora perplexa</i>	Obscure beak-rush		T	G5	S2
<i>Sagittaria graminea</i>	Grass-leaved arrow head		T	G5	S1
<i>Trillium pusillum</i> var. <i>pusillum</i>	Least trillium	C2	E	G3T2	S1S2
<i>Utricularia subulata</i>	Zigzag bladderwort		T	G5	S1
<i>Vaccinium ellottii</i>	Mayberry		E	G5Q	S1
<i>Vaccinium macrocarpon</i>	Large cranberry		T	G4	S2
<i>Woodwardia virginica</i>	Virginia chainfern		S	G5	S2
<i>Xyris fimbriata</i>	Fringed Yellow-eyed-grass		E	G5	S1
<i>Xyris laxifolia</i> var. <i>iridifolia</i>	Wide-leaved yellow-eyed-grass		S	G4G5T 4T5	S2
<i>Zigadenus leimanthoides</i>	Death Camass		T	G4Q	S2

Status refers to the legal protection afforded the species.

C2 indicates a species formerly classified as a federal candidate species.

T = Threatened, E = Endangered, S = Special Concern, PT = Proposed Threatened, PE = Proposed Endangered, CE = commercially exploited

Rank is an indication of global and state rarity ranging from 1 (most rare) to 5 (most common)

? = inexact numeric rank

Q = taxonomic status is questionable, numeric rank may change with taxonomy

T = taxonomic subdivision (trinomial)

Source: Call, 2003 and TDEC Natural Heritage Website, 2004a.

Animals		Designated Status		Rank	
Scientific Name	Common Name	Federal	Tennessee	Global	Tennessee
<i>Accipiter striatus</i>	Sharp-shinned Hawk		D	G5	S2
<i>Aimophila aestivalis</i>	Bachman's Sparrow		E	G3	S2
<i>Ambystoma talpoideum</i>	Mole Salamander		D	G5	S4
<i>Ammodramus henslowii</i>	Henslow's Sparrow	C		G4	SPB
<i>Ammodramus savannarum</i>	Grasshopper Sparrow		D	G5	S4
<i>Circus cyaneus</i>	Northern Harrier		D	G5T?	S1N
<i>Haliaeetus leucocephalus</i>	Bald Eagle	T	T	G4	S1
<i>Hemidactylum scutatum</i>	Four-toed salamander		D	G5	S3
<i>Hemitremia flammea</i>	Flame Chub		D	G4	S4
<i>Hyla gratiosa</i>	Barking Tree Frog		D	G5	S3
<i>Myotis griseescens</i>	Gray Bat	E	E	G2G3	S2
<i>Myotis sodalis*</i>	Indiana Bat	E	E	G1	S1
<i>Napaeozapus insignis</i>	Woodland Jumping Mouse		D	G5	S4
<i>Ophisaurus attenuatus</i>	Eastern Slender Glass Lizard		D	G5T5	S3
<i>Pituophis melanoleucus melanoleucus</i>	Northern Pine Snake		T	G5T4	S3
<i>Pleurobema gibberum</i>		E	E	G1	S1
<i>Rana capito</i>	Cumberland Pigtoe	C1NL	?	G4T3	S1
<i>Sorex cinereus</i>	Gopher Frog		D	G5	S4
<i>Sorex fumeus</i>	Masked Shrew		D	G5	S4
<i>Sorex longirostris</i>	Smoky Shrew		D	G5	S4
<i>Zapus hudsonius</i>	Southeastern Shrew		D	G5	S4
	Meadow Jumping Mouse				

C2 and C1NL indicate species formerly classified as a federal candidate species.

T = Threatened, E = Endangered, D = Deemed in Need of Management

Rank is an indication of global and state rarity ranging from 1 (most rare) to 5 (most common)

* = possible occurrence

Source: Call, 2003; TDEC Natural Heritage Website, 2004b; TDEC Natural Heritage Website, 2004c.

Appendix E

Conservation Target Species Occurring in Wetlands on Arnold Air Force Base

Conservation Target Species Occurring in Wetland Flats

Carex barrattii (Barratt's sedge)
Iris prismatica (Slender blue flag)
Listera australis (Southern twayblade)
Lycopodiella alopecuroides (Foxtail clubmoss)
Muhlenbergia torreyana (Torrey's dropseed)
Platanthera flava var. *flava* (Southern rein-orchid)
Trillium pusillum var. *pusillum* (Least trillium)
Vaccinium macrocarpon (Cranberry)
Zigadenus leimanthoides (Death camas)

Conservation Target Species Occurring in Wetland Depressions

Ambystoma talpoideum (Mole salamander)
Hemidactylum scutatum (Four-toed salamander)
Rana capito (Gopher frog)
Clethra alnifolia (Coastal sweet pepperbush)
Hypericum adpressum (Creeping St. John's-wort)
Lachnanthes caroliniana (Carolina redroot)
Ludwigia sphaerocarpa (Globe-fruited false loosestrife)
Panicum aciculare (Needleleaf witchgrass)
P. acuminatum var. *densiflorum* (Eaton's witchgrass)
P. acuminatum var. *leucothrix* (Roughish witchgrass)
P. ensifolium (Small-leaved panicgrass)
P. hemitomon (Maidencane)
Rhynchospora perplexa (Obscure beakrush)
Sagittaria graminea (Grass-leaved arrowhead)
Vaccinium elliottii (Mayberry)
Woodwardia virginica (Virginia chainfern)
Xyris fimbriata (Fringed yellow-eyed-grass)
X. iridifolia (Wide-leaved yellow-eyed-grass)

Source: Call, 2003 and TDEC Natural Heritage Website, 2004a.

Appendix F

Conservation Target Species Occurring in Woodland/Savanna/Grassland Habitats on Arnold Air Force Base

Species Occurring on Dry Sites:

Circus cyaneus (Northern harrier)
Ophisaurus attenuatus (Eastern slender glass lizard)
Agalinis pseudophylla (Shinner's false-foxglove)
Echinacea pallida (Pale purple coneflower)
Festuca paradoxa (Slender fescue)
Gentiana puberulenta (Prairie gentian)
Gymnopogon brevifolius (Broad-leaved beardgrass)
Helianthemum propinquum (Low frostweed)
Helianthus eggertii (Eggert's sunflower)
Lechea pulchella (Leggett's pinweed)
Lespedeza angustifolia (Narrowleaf bushclover)
Prenanthes aspera (Harsh rattlesnake-root)

Species Occurring on Mesic Sites:

Asclepias hirtella (Prairie milkweed)
Eupatorium leucolepis (White-bracted thoroughwort)
Polygala nuttallii (Nuttall's milkwort)
Pogonia ophioglossoides (Rose pogonia)
Prunus pumila (Sand cherry)
Platanthera integra (Yellow fringeless orchid)

Source: Call, 2003 and TDEC Natural Heritage Website, 2004a

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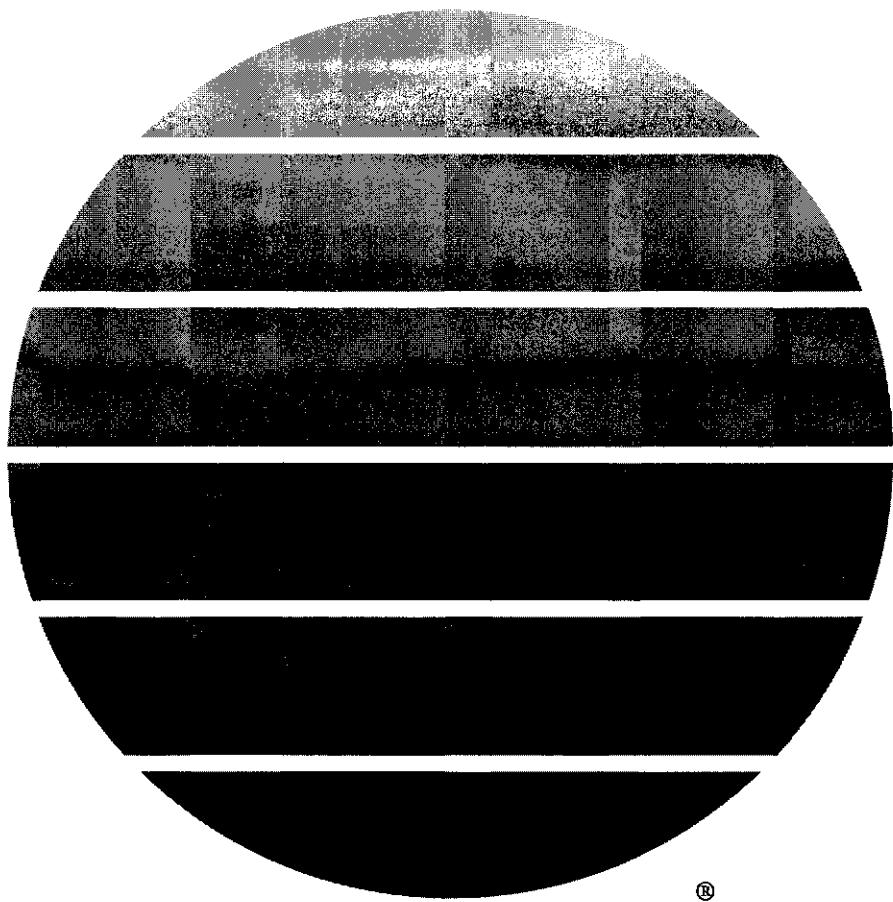
Appendix G

Material Safety Data Sheets



Escort[®]

herbicide



“.....A Growing Partnership With Nature”



Escort®

herbicide

Dry Flowable

<u>Active Ingredient</u>	<u>By Weight</u>
Metsulfuron methyl	
Methyl 2-[[[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]-carbonyl]amino]sulfonyl]benzoate	60%
<u>Inert Ingredients</u>	40%
TOTAL	100%

EPA Reg. No. 352-439

KEEP OUT OF REACH OF CHILDREN

CAUTION

STATEMENT OF PRACTICAL TREATMENT

In case of contact with eyes, immediately flush with plenty of water. If on skin, wash with plenty of soap and water. Get medical attention if irritation persists.

For medical emergencies involving this product, call toll free 1-800-441-3637.

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION! Causes eye irritation. Avoid contact with skin, eyes or clothing. Avoid breathing dust or spray mist.

PERSONAL PROTECTIVE EQUIPMENT
Applicators and other handlers must wear:

Long-sleeved shirt and long pants.

Shoes plus socks.

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

USER SAFETY RECOMMENDATIONS

Users should: Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.

ENVIRONMENTAL HAZARDS

Do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters.

This herbicide is injurious to plants at extremely low concentrations. Nontarget plants may be adversely effected from drift and run-off.

IMPORTANT

DO NOT USE ON FOOD OR FEED CROPS EXCEPT AS RECOMMENDED BY THIS LABEL OR SUPPLEMENTAL LABELING. Injury to or loss of desirable trees or other plants may result from failure to observe the following: Do not apply ESCORT® Herbicide (except as recommended), or drain or flush equipment on or near desirable trees or other plants, or on areas where their roots may extend or in locations where the chemical may be washed or moved into contact with their roots. Do not use on lawns, walks, driveways, tennis courts, or similar areas. Prevent drift of spray to desirable plants. Do not contaminate any body of water, including irrigation water. Keep from contact with fertilizers, insecticides, fungicides and seeds.

Following an ESCORT® application, do not use sprayer for application to crops. This is extremely important, as low rates of ESCORT® can kill or severely injure most crops (except small grains).

GENERAL INFORMATION

DuPont ESCORT® Herbicide is a dispersible granule that is mixed in water and applied as a spray. ESCORT® controls many annual and perennial weeds and woody plants in non-crop areas and conifer plantations.

ESCORT® may be used for general weed and brush control on industrial non-crop sites and for selective weed control in certain types of unimproved turf grasses on industrial sites and in native grasses. It can also be used for controlling and suppressing undesirable weeds and hardwoods in conifer plantations.

ESCORT® controls weeds and woody plants primarily by postemergent activity. Although ESCORT® has preemergence activity, best results are generally obtained when ESCORT® is applied to foliage after emergence or dormancy break. Except where noted, ESCORT® provides the best results when applied to young, actively growing weeds. The use rate depends upon the weed species and size at the time of application.

The degree and duration of control may depend on the following:

- weed spectrum and infestation intensity
- weed size at application
- environmental conditions at and following treatment
- soil pH, soil moisture, and soil organic matter

It is permissible to apply ESCORT® to floodplains where surface water is not present, terrestrial areas of deltas and low lying areas where water is drained but may be isolated in pockets due to uneven or unlevel conditions.

ESCORT® is noncorrosive, nonflammable, nonvolatile and does not freeze.

ENVIRONMENTAL CONDITIONS AND BIOLOGICAL ACTIVITY

ESCORT® is absorbed primarily through the foliage of plants, and by the roots to a lesser degree. Plant cell division is generally inhibited in sensitive plants within a few hours following uptake. Two to 4 weeks after application, leaf growth slows followed by discoloration and tissue death. The final effect on annual weeds are evident about 4 to 6 weeks after application. The ultimate effect on perennial weeds and woody plants occurs in the growing season following application.

Warm, moist conditions following treatment promote the activity of ESCORT®, while cold, dry conditions may reduce or delay activity. Weeds and brush hardened off by cold weather or drought stress may not be controlled.

The use of a surfactant is recommended to enhance the control of susceptible plants, except where noted. Apply at a minimum rate (concentration) of 1/4% volume/volume (1 qt. per 100 gal. of spray solution), or at the manufacturer's recommended rate. Use only EPA approved surfactants containing at least 80% active ingredient. Certain types of surfactants, such as those incorporating acetic acid (i.e. LI-700), may not be compatible with ESCORT® and may result in decreased performance. Certain surfactants may not be suitable for use on desirable plants, such as turf and conifers, listed on this label. Consult the surfactant manufacturer's label for appropriate uses.

Weed and brush control may be reduced if rainfall occurs soon after application.

RESISTANCE

Biotypes of certain weeds listed on this label are resistant to ESCORT® and other herbicides with the same mode of action, even at exaggerated application rates. Biotypes are naturally occurring individuals of a species that are identical in appearance but have slightly different genetic compositions; the mode of action of a herbicide is the chemical interaction that interrupts a biological process necessary for plant growth and development.

If weed control is unsatisfactory, it may be necessary to retreat problem areas using a product with a different mode of action, such as postemergence broadleaf and/or grass herbicides.

If resistant weed biotypes such as kochia, prickly lettuce, and Russian thistle are suspected or known to be present use a tank-mix partner with ESCORT® to help control these biotypes, or use a planned herbicide rotation program where other residual broadleaf herbicides having different modes of action are used.

INTEGRATED PEST MANAGEMENT

To better manage weed resistance when using ESCORT®, use a combination of tillage, and tank-mix partners or sequential herbicide applications that have a different mode of action than ESCORT®, to control escaped weeds. Do not let weed escapes go to seed.

Consult your agricultural dealer, consultant, applicator, and/or appropriate state agricultural extension service representative for specific alternative herbicide recommendations available in your area.

It is advisable to keep accurate records of pesticides applied to treated areas to help obtain information on the spread and dispersal of resistant biotypes.

DIRECTIONS FOR USE

It is a violation of federal law to use this product in a manner inconsistent with its labeling.

ESCORT® should be used only in accordance with recommendations on this label or in separately published DuPont recommendations.

DuPont will not be responsible for losses or damages resulting from the use of this product in any manner not specifically recommended by DuPont. User assumes all risks associated with such nonrecommended use.

For tank mixes, use the most restrictive limitations from the labeling of the products being mixed. Use only those tank mix partners which are labeled for the appropriate use site. Do not apply more than 4 ounces of ESCORT® per acre per year.

Do not use on food or feed crops except as recommended by this label or supplemental labeling.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application.

For any requirements specific to your State or Tribe, consult the agency in your State responsible for pesticide regulation.

AGRICULTURAL USES

AGRICULTURAL USE REQUIREMENTS

Use this produce only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted-entry interval. The requirements in this box only apply to use of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 4 hours. PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

Coveralls.

Shoes plus socks.

CONIFER PLANTATIONS

Application Information

ESCORT® is recommended to control many species of weeds and deciduous trees on sites where conifers are growing or are to be planted. Apply by ground equipment or by air (helicopter only). Refer to the "Weeds Controlled" and "Brush Species Controlled" for a listing of susceptible species.

Application Timing

Apply ESCORT® after weeds have emerged or after undesirable hardwoods have broken winter dormancy and have reached the point of full leaf expansion.

Conifer Site Preparation

--Application Before Transplanting

After consulting the "Weeds Controlled" and "Brush Species Controlled" tables apply the rates of ESCORT® recommended for the most difficult to control species on the site.

Southeast—Apply up to 4 oz per acre for loblolly and slash. Transplant the following planting season.

Northeast and Lake States—Apply up to 2 oz per acre for red pine. Transplant the following planting season.

West—Apply up to 2 oz per acre for Douglas fir in the Coast Range and western slope. Transplant at least 90 days after treatment.

Tank Mix Combinations—

For broader spectrum control the following products are recommended in combination with ESCORT®.

Accord²

Tank mix 1 to 2 ounces of ESCORT® with 2 to 10 quarts of Accord per acre. Refer to the product container for a list of species controlled.

Arsenal Applicator's Concentrate¹

Tank mix 1 to 2 ounces of ESCORT® with 10 to 24 fluid ounces of Arsenal Applicator's Concentrate per acre.

Loblolly and slash pines may be transplanted the planting season following application. The combination controls ash, black gum, cherry, hawthorn, honeysuckle, hophornbeam, persimmon, oaks (red, white and water), sassafras, sweetgum, Vaccinium species, and suppresses blackberry, dogwood, elms, myrtle dahoos, hickories, and red maple,.

Accord² + Arsenal¹ Applicators Concentrate

Tank mix 1/2 to 1 ounce of ESCORT® with 16 to 64 fluid ounces of Accord and 10 to 12 fluid ounces of Arsenal Applicator's Concentrate per acre. Slash and loblolly pines may be transplanted the planting season following application. The combination controls cherry, dogwood, elms, oaks (red and water), persimmon, sassafras, sweetgum and suppresses hickory.

VELPAR® L or VELPAR® DF

Tank mix 1 to 2 ounces of ESCORT® per acre with VELPAR® L or VELPAR® DF at the rates recommended on the container for various soil textures. Loblolly and slash pines may be transplanted the planting season following application. Refer to the product container for a list of species controlled.

OUST®

Tank mix 1/2 to 1 1/2 ounces of ESCORT® with 2 to 3 ounces of OUST® per acre for herbaceous weed control. Refer to the product container and the "Weeds Controlled" section of this label for a listing of the weeds controlled. Loblolly and slash pines may be transplanted the planting season following application.

Tank mix 2 ounces of ESCORT® with 3 ounces of OUST® per acre for herbaceous weed control and early spring suppression of bull thistle and Canada thistle in the Coast Range and western slope of the Cascade Mountains. Douglas fir may be transplanted at least 90 days following application.

Release

--Hardwood Control and Suppression

ESCORT® is recommended for application over the top of established slash and loblolly pine to control the species listed in "Weeds Controlled" and "Brush Species Controlled" section of this label. Apply 1 to 4 ounces per acre to control the species indicated, including kudzu.

Tank Mix Combinations—

For broader spectrum control the following products are recommended in combination with ESCORT®.

Arsenal Applicator's Concentrate¹

Tank mix 1 to 2 ounces of ESCORT® with 8 to 16 fluid ounces of Arsenal Applicator's Concentrate per acre may be applied to loblolly pine. Refer to the Arsenal Applicator's Concentrate label regarding the use of surfactants and the appropriate application timing with respect the age and development stage of the pines. The combination controls ash, black gum, cherry, hawthorn, honeysuckle, hophornbeam, oaks (red, white and water), sassafras, sweetgum, Vaccinium species, and suppresses blackberry, dogwood, elms, myrtle dahoos, hickories, persimmon, and red maple.

VELPAR® L or VELPAR® DF

Tank mix 1 to 2 ounces of ESCORT® with VELPAR® L or VELPAR® DF at the rates recommended on the container for various soil textures. The combination may be applied to loblolly and slash pines.

Release

--Herbaceous Weed Control

ESCORT® may be applied to transplanted loblolly and slash pine for the control of herbaceous competition. Consult the "Weeds Controlled" for a listing of the susceptible species and recommended application rates. Best results are obtained when ESCORT® is applied just before weed emergence until shortly after weed emergence.

Tank Mix Combinations—

For broader spectrum control the following products are recommended in combination with ESCORT®.

Arsenal Applicators Concentrate¹

Tank mix 1/2 to 1 ounce of ESCORT® with 4 fluid ounces of Arsenal Applicators Concentrate per acre. The tank mix may be used on loblolly pine.

OUST®

Tank mix 1/2 to 1 1/2 ounces of ESCORT® with 2 to 3 ounces of OUST® per acre. Best results are obtained when ESCORT® is applied just before weed emergence until shortly after weed emergence. The tank mix may be used on loblolly and slash pine.

VELPAR® L or VELPAR® DF

Tank mix 1/2 to 1 ounce of ESCORT® with VELPAR® L or VELPAR® DF at the rates recommended on the container for various soil textures. The combination may be applied to loblolly and slash pines.

IMPORTANT PRECAUTIONS

—CONIFER PLANTATIONS ONLY

- Applications of ESCORT® made to conifers that are suffering from loss of vigor caused by insects, diseases, drought, winter damage, animal damage, excessive soil moisture, planting shock, or other stresses may injure or kill the trees.
- Applications of ESCORT® made for herbaceous release should only be made after adequate rainfall has closed the planting slit and settled the soil around the roots following transplanting.
- Do not apply ESCORT® to conifers grown as ornamentals.
- ESCORT® applications may result in damage and mortality to other species of conifers when they are present on sites with those listed in the preceding recommendations for conifer plantations.

HARDWOOD PLANTATIONS

Application Information

ESCORT® is recommended to control many species of weeds on sites where yellow poplar is growing or is to be planted. Apply by ground equipment or by air (helicopter only). Refer to the "Weeds Controlled" sections of this label for a listing of susceptible species.

Application Timing

ESCORT® may be applied over the top of planted seedlings after the soil has settled around the root systems but before the seedlings have broken dormancy (bud break).

Release

--Herbaceous Weed Control

ESCORT® may be applied to yellow poplar for the control of herbaceous competition. Consult the "Weeds Controlled" for a listing of the susceptible species and recommended application rates. Best results are obtained when ESCORT® is applied just before weed emergence until shortly after weed emergence.

Tank Mix Combinations—

Tank mix 1/2 ounce of ESCORT® with 4 to 6 pints of VELPAR® L as recommended on the package label for "RELEASE--HERBACEOUS WEED CONTROL" in pine plantations in the eastern U.S. Follow the VELPAR® L label recommendations regarding altering the application rate by soil texture.

IMPORTANT PRECAUTIONS

—HARDWOOD PLANTATIONS ONLY

- Application of VELPAR® L and ESCORT® made to yellow poplar that are suffering from loss of vigor caused by insects, disease, drought, winter damage, animal damage, excessive soil moisture, planting shock or other stresses may injure or kill the seedlings.
- Applications of ESCORT® made for release should only be made after adequate rainfall has closed the planting slit and settled the soil around the roots following transplanting.
- The use of surfactant is not recommended for applications made over the tops of trees.
- Careful consideration must be given by an experienced and knowledgeable forester to match the requirements of yellow poplar to the conditions of the site. Treatment of yellow poplar planted on a site inadequate to meet its requirements may injure or kill the seedlings.

NON-AGRICULTURAL USES

NON-AGRICULTURAL USE REQUIREMENTS

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard for agricultural pesticides (40 CFR Part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries, or greenhouses.

Non-crop industrial weed control and selective weed control in turf (industrial, unimproved only) are not within the scope of the Worker Protection Standard.

WEEDS CONTROLLED

1/3 to 1/2 ounce per acre

Annual sowthistle
Aster
Bahiagrass
Beebalm
Bittercress
Bitter sneezeweed
Blackeyed-susan
Blue mustard
Bur buttercup
Chicory
Clover
Cocklebur
Common chickweed
Common groundsel
Common purslane
Common yarrow
Conical catchfly
Corn cockle
Cow cockle
Crown vetch
Dandelion
Dogfennel
False chamomile
Fiddleneck tarweed
Field pennycress
Flixweed

1/2 to 1 ounce per acre

Blackberry
Black henbane
Broom snakeweed*
Buckhorn plantain
Common crupina
Common sunflower
Curly dock
Dewberry
Dyer's woad
Gorse
Halogenon
Henbit
Honeysuckle
Multiflora rose and other
wild roses
Musk thistle***
Plumeless thistle
Prostrate knotweed
Rosering gaillardia
Seaside arrowgrass
Sericea lespedeza
Teasel
Wild lettuce
Wild mustard
Wooly croton
Wood sorrel
Yankeweed

1 to 2 ounces per acre

Bull thistle
Common mullein
Common tansy
Field bindweed**
Gumweed
Houndstongue
Perennial pepperweed
Poison hemlock
Kudzu

1 1/2 to 2 ounces per acre

Canada thistle**
Dalmatian toadflax**
Duncecap larkspur

3 to 4 ounces per acre

Kudzu

to untreated areas. Apply as a full coverage spray for best performance.

*** Certain biotypes of musk thistle are more sensitive to ESCORT® and may be controlled with rates of 1/4 to 1/2 ounce per acre. Treatments of ESCORT® may be applied from rosette through bloom stages of development.

Tank Mix Combination

For broader spectrum control and for use on certain biotypes of broadleaf weeds which may be resistant to ESCORT® and herbicides with the same mode of action, the following tank mixes are recommended.

Dicamba + 2,4-D

Combine 1/2 to 1 ounce of ESCORT® with 8 fluid ounces of dicamba and 16 fluid ounces of 2,4-D for the control of kochia.

Combine 1/2 ounce of ESCORT® with 8 fluid ounces of dicamba and 16 fluid ounces of 2,4-D for the control of spotted knapweed.

Combine 1 ounce of ESCORT® with 8 fluid ounces of dicamba and 16 fluid ounces of 2,4-D for the suppression of rush skeletonweed.

NONCROP (INDUSTRIAL) SITES

Application Information

ESCORT® is recommended for use for general weed and brush control on non-crop, industrial sites such as airports, military installations, fence rows, roadsides and associated rights-of-way, petroleum tank farms, pipeline and utility rights-of-way, pumping stations, railroads, storage areas, plant sites and other similar areas including governmental and private lands. It is also recommended for the control of certain noxious and troublesome weeds.

Consult the "Weeds Controlled" and "Brush Species Controlled" tables to determine the appropriate application rate.

ESCORT® may be applied in tank mixture with other herbicides labeled for use on non-crop sites. Fully read the labels and follow all directions and restrictions on each label.

Application Timing

For best results, ESCORT® should be applied postemergence to young, actively growing weeds.

Applications may be made at any time of the year, except when the ground is frozen.

* Apply fall through spring.

** Suppression, which is a visual reduction in weed competition (reduced population or vigor) as compared

GRASS REPLANT INTERVALS

Following an application of ESCORT® to non-crop areas, the treated sites may be replanted with various species of grasses at the intervals recommended below.

For soils with a pH of 7.5 or less observe the following replant intervals:

Species	ESCORT® Rate oz/a	Replant Interval (months)
Brome, Meadow	1/2--1	2
	1--2	3
Brome, Smooth	1/2--1	2
	1--2	4
Fescue, Alta	1/2--1	2
	1--2	4
Fescue, Red	1/2--1	2
	1--2	4
Fescue, Sheep	1/2--1	1
	1--2	4
Foxtail, Meadow	1/2--1	2
	1--2	4
Green Needlegrass	1/2--2	1
Orchardgrass	1/2--1	2
	1--2	4
Russian wildrye	1/2	1
	1	2
	2	3
Switchgrass	1/2--1	1
	1--2	3
Timothy	1/2--1	2
	1--2	4
Wheatgrass, Western	1/2--1	2
	1--2	3

For soils with a pH of 7.5 or greater observe the following replant intervals:

Species	ESCORT® Rate oz/a	Replant Interval (months)
Alkali Sacaton	1/2--1	1
	1--2	3
Bluestem, Big	1/2--2	3
	1/2--1	1
Brome, Mountain	1--2	2
	1/2--2	1
Gramma, Blue	1/2--2	1
	1/2	2
Gramma, Sideoats	>1/2	>3
	1/2	2
Switchgrass	>1/2	>3
	1/2	2
Wheatgrass, Thickspike	1/2--2	1
	1/2--1	2
Wheatgrass, Western	1--2	3

The recommended intervals are for applications made in the Spring to early Summer. Because ESCORT® degradation is slowed by cold or frozen soils, applications made the late Summer or Fall should consider the intervals as beginning in the Spring following treatment.

Testing has indicated that there is considerable variation in response among the species of grasses when seeded into areas treated with ESCORT®. If species other than those listed above are to be planted into areas treated with

ESCORT® a field bioassay should be performed, or previous experience may be used, to determine the feasibility of replanting treated sites.

TURF, INDUSTRIAL (UNIMPROVED ONLY)

Application Information

ESCORT® is recommended for selective weed control in unimproved industrial turf where certain grasses are well established and desired as ground cover. ESCORT® is also recommended for the control certain noxious and troublesome weeds in turf.

In addition to conventional spray equipment, ESCORT® may also be applied with invert emulsion equipment. When using an invert emulsion, mix the prescribed rate of ESCORT® in the water phase.

Consult the "Weeds Controlled" table to determine which weeds will be controlled by the following recommendations.

Fescue and Bluegrass--

Apply 1/4 to 1/2 ounce of ESCORT® per acre.

Crested Wheatgrass and Smooth Brome--

Apply 1/4 to 1 ounce of ESCORT® per acre.

Bermudagrass--

Apply 1/4 to 2 ounces of ESCORT® per acre.

Application Timing

Applications may be made at anytime of the year, except when the soil is frozen.

When a spring application is made on fescue or bluegrass, a second application may be made during the summer after full seedhead maturation.

Growth Suppression and Seedhead Inhibition

(Chemical Mowing)

Application Information

ESCORT® is recommended for growth suppression and seedhead inhibition in well established fescue and bluegrass turf at the use rate of 1/4 to 1/2 ounce per acre.

Tank Mix Combination

ESCORT® may be tank mixed with Embark³ for improved performance in the regulation of growth and seedhead suppression. Tank mix 1/4 to 1/2 ounce of ESCORT® with 1/8 to 1/4 pint of Embark.

Application Timing

Application may be made after at least 2 to 3 inches of new growth has emerged until the appearance of the seed stalk.

IMPORTANT PRECAUTIONS

—INDUSTRIAL TURF ONLY

- An application of ESCORT® may cause temporary discoloration (chlorosis) of the grasses. Use the lower recommended rates for minimum discoloration.
- With fescue and bluegrass, sequential applications made during the same or consecutive growth periods (i.e. spring and fall) may result in excessive injury to turf.
- Excessive injury may result when ESCORT® is applied to turf that is under stress from drought, insects, disease, cold temperatures (winter injury) or poor fertility.
- ESCORT® is not recommended for use on bahiagrass.

NATIVE GRASSES

ESCORT® is recommended for weed control and suppression in the establishment and maintenance of native grasses. It may be used where blue grama, bluestems (big, little, plains, sand, ww spar) bromegrasses (meadow),

buffalograss, green sprangletop, indiangrass, kleingrass, lovegrasses (atherstone, sand, weeping, wilman), orchardgrass, sideoats grama, switchgrass (blackwell), wheatgrass (bluebunch, intermediate, pubescent siberian, slender, streamband, tall, thickspike, western), and russian wildrye are established. It may also be applied over these species in the seedling stage, except for orchardgrass and russian wildrye.

Application Information

Apply ESCORT® at the rate of 1/10 ounce per acre for the control and suppression* of bur buttercup (testiculate), common purslane, common sunflower*, cutleaf eveningprimrose*, flixweed*, lambsquarters* (common and slimleaf), marestail*, pigweed (redroot and tumble), snow speedwell, tansymustard* and tumble mustard (Jim Hill mustard).

* Suppression is a visual reduction in weed competition (reduced population or vigor) as compared to untreated areas. Degree of suppression will vary with the size of weed and environmental conditions following treatment.

Application Timing

For established grasses, apply when weeds are in the seedling stage.

For grasses in the seedling stage, apply preplant or preemergence where the soil (seed bed) has been cultivated.

BRUSH CONTROL

Application Information

ESCORT® is recommended for the control of undesirable brush growing in non-crop areas. Applications may be made by air, high volume ground application, low volume ground application and ultra-low volume ground application. Except as noted for multiflora rose, ESCORT® should be applied as a spray to the foliage.

The application volume required will vary with the height and density of the brush and the application equipment used. Generally, aerial applications will require 15 to 25 gallons of water per acre; high volume ground application will require 100 to 400 gallons of water per acre; low volume ground application will require 20 to 50 gallons of water per acre; and ultra-low volume ground application will require 10 to 20 gallons of water per acre.

Regardless of the application volume and equipment used, thorough coverage of the foliage is necessary to optimize results.

BRUSH SPECIES CONTROLLED

Species	High Volume	Broadcast
	ESCORT® Rate oz/100 gal	ESCORT® Rate oz/a
Ash	1-2	1-3
Aspen	1-2	1-3
Black locust	1-2	1-3
Blackberry	1-2	1-3
Camelthorn	1-2	1-3
Cherry	1-2	1-3
Cottonwood	1-2	2-3
Eastern red cedar	1-2	2-3
Elder	1-2	2-3
Elm	1-2	1-3
Firs	3	1-2
Hawthorn	1-2	1-3
Honeysuckle	1-2	1/2--1
Mulberry	1-2	2-3
Multiflora rose	1-2	1-3
Muscadine (wild grape)	1-2	2-3
Oaks	1-2	1-3
Ocean spray (Holodiscus)	1-2	2-3
Osage orange	1-2	2-3
Red maple	1-2	2-3
Salmonberry	1/2-1	1-3
Snowberry	1/2-1	1-3
Spruce (black and white)	3	2-3
Thimbleberry	1/2-1	1-3
Tulip tree	1/2-1	1-3
Wild roses	1/2-1	1-3
Willow	1/2-1	1-3

For low volume and ultra-low volume ground applications, mix 4 to 8 ounces of ESCORT® per 100 gallons of spray solution.

Application Timing

Make a foliar application of the recommended rate of ESCORT® during the period from full leaf expansion in the spring until the development of full fall coloration on deciduous species to be controlled. Coniferous species may be treated at anytime during the growing season.

Tank Mix Combinations—

Accord²

After consulting the "Brush Species Controlled" table, tank mix the prescribed rate of ESCORT® with the rate of Accord indicated for the various application methods on the Accord label. Refer to the Accord label for list of species controlled.

Arsenal¹ Herbicide

Combine 1 to 2 ounces of ESCORT® with 1 to 4 pints of Arsenal Herbicide per acre and apply as a broadcast spray. Aerial applications should use a minimum of 15 gallons per acre spray volume. In addition to species listed above controlled by ESCORT®, this combination controls black gum, hophornbeam, sassafras, sweetgum, Vaccinium species, dogwood, myrtle dahooon, hickories, and persimmon.

Garlon⁴ or Garlon 4

After consulting the "Brush Species Controlled" table, tank mix the prescribed rate of ESCORT® with the rate of Garlon indicated for the various application methods on the Garlon label. Refer to the Garlon label for list of species controlled.

KRENITE® S

After consulting the "Brush Species Controlled" table, tank mix the prescribed rate of ESCORT® with the rate of KRENITE® S indicated for the various application methods on the KRENITE® S label. Refer to the KRENITE® S label for list of species controlled.

Tordon K⁵

After consulting the "Brush Species Controlled" table, tank mix the prescribed rate of ESCORT® with the rate of Tordon K indicated for the various application methods on the Tordon K label. Refer to the Tordon K label for list of species controlled.

Tordon K⁵ + Arsenal¹ Herbicide

Combine 1 to 1 1/2 ounce of ESCORT® with 2 to 8 fluid ounces of Arsenal and 1 to 2 pints of Tordon K per 100 gallons of water. Apply as a high volume spray. The tank mix controls cherry, elms, box elder, maples, hackberry, redbud, ash, oaks (including shingle oak), black locust and sassafras.

*Tordon K is a restricted use pesticide.

Spotgun Basal Soil Treatment

For control of multiflora rose, prepare a spray suspension of ESCORT® by mixing 1 ounce per gallon of water. Mix vigorously until the ESCORT® is dispersed and agitate periodically while applying the spray suspension.

Apply the spray preparation with an exact delivery handgun applicator. Apply at the rate of 4 milliliters for each 2 feet of rose canopy diameter. Direct the treatment to the soil within 2 feet of the stem union. When treating large plants and more than one delivery is required, make applications on opposite sides of the plant.

Applications should be made from early spring to summer.

IMPORTANT PRECAUTIONS

—NON-CROP BRUSH ONLY

- When using tank mixtures of ESCORT® with companion herbicides, read and follow all use instructions, application rates, warnings and precautions appearing on the labels. Follow the most restrictive label instructions for each of the herbicides used.

SPRAY EQUIPMENT

Following an ESCORT® application, do not use the sprayer or mixing equipment for application to agricultural crops, except that it may be used to treat pasture, range and wheat.

This is extremely important as low rates of ESCORT® can kill or severely injure most agricultural crops.

The selected sprayer should be equipped with an agitation system to keep ESCORT® suspended in the spray tank. Use a sufficient volume of water to thoroughly cover the foliage of undesirable weeds, generally 10 to 40 gallons per acre. Select a spray volume and delivery system that will deliver a uniform spray pattern. Be sure the sprayer is calibrated before use. Avoid overlapping and shut off spray booms while starting, turning, slowing or stopping to avoid injury to desired plants.

Refer to the brush control section of this label for information unique to that particular use.

MIXING INSTRUCTIONS

1. Fill the tank 1/4 to 1/3 full of water.
2. While agitating, add the required amount of ESCORT®.
3. Continue agitation until the ESCORT® is fully dispersed, at least 5 minutes.
4. Once the ESCORT® is fully dispersed, maintain agitation and continue filling tank with water. ESCORT® should be thoroughly mixed with water before adding any other material.
5. As the tank is filling, add tank mix partners (if desired) then add the necessary volume of nonionic surfactant. Always add surfactant last.
6. If the mixture is not continuously agitated, settling will occur. If settling occurs, thoroughly re-agitate before using.
7. ESCORT® spray preparations are stable if they are pH neutral or alkaline and stored at or below 100° F.
8. If ESCORT® and a tank mix partner are to be applied in multiple loads, pre-slurry the ESCORT® in clean water prior to adding to the tank. This will prevent the tank mix partner from interfering with the dissolution of the ESCORT®.

SPRAYER CLEANUP

Spray equipment must be cleaned before ESCORT® is sprayed. Follow the cleanup procedures specified on the labels of previously applied products. If no directions are provided, follow the six steps outlined below.

At the End of the Day

When multiple loads of ESCORT® herbicide are applied, it is recommended that at the end of each day of spraying, the interior of the tank be rinsed with fresh water and then partially filled, and the boom and hoses flushed. This will prevent the buildup of dried pesticide deposits that can accumulate in the application equipment.

1. Drain tank; thoroughly rinse spray tanks, boom, and hoses with clean water. Loosen and physically remove any visible deposits.
2. Fill the tank with clean water and 1 gal of household ammonia* (contains 3% active) for every 100 gal of water. Flush the hoses, boom, and nozzles with the cleaning solution. Then add more water to completely fill the tank. Circulate the cleaning solution through the tank and hoses for at least 15 min. Flush the hoses, boom, and nozzles again with the cleaning solution, and then drain the tank.
3. Remove the nozzles and screens and clean separately in a bucket containing cleaning agent and water.
4. Repeat step 2.
5. Rinse the tank, boom, and hoses with clean water.
6. If only Ammonia is used as a cleaner, the rinsate solution may be applied back to the crop(s) recommended on this label. Do not exceed the maximum labeled use rate. If other cleaners are used, consult the cleaner label for rinsate disposal instructions. If no instructions are given, dispose

of the rinsate on site or at an approved waste disposal facility.

* Equivalent amounts of an alternate-strength ammonia solution or a DuPont-approved cleaner can be used in the cleanout procedure. Carefully read and follow the individual cleaner instructions. Consult your agricultural dealer, applicator, or DuPont representative for a listing of approved cleaners.

Notes:

- 1. Attention:** Do not use chlorine bleach with ammonia, as dangerous gases will form. Do not clean equipment in an enclosed area.
2. Steam-cleaning aerial spray tanks is recommended prior to performing the above cleanout procedure to facilitate the removal of any caked deposits.
3. When ESCORT® is tank mixed with other pesticides, all required cleanout procedures should be examined and the most rigorous procedure should be followed.
4. In addition to this cleanout procedure, all precleanout guidelines on subsequently applied products should be followed as per the individual labels.

SPRAY DRIFT MANAGEMENT

The interaction of many equipment and weather-related factors determines the potential for spray drift. The applicator is responsible for considering all these factors when making application decisions.

**AVOIDING SPRAY DRIFT IS THE RESPONSIBILITY
OF THE APPLICATOR.**

IMPORTANCE OF DROPLET SIZE

The most effective way to reduce drift potential is to apply large droplets (>150 - 200 microns). The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. The presence of sensitive species nearby, the environmental conditions, and pest pressure may affect how an applicator balances drift control and coverage. **APPLYING LARGER DROPLETS REDUCES DRIFT POTENTIAL, BUT WILL NOT PREVENT DRIFT IF APPLICATIONS ARE MADE IMPROPERLY OR UNDER UNFAVORABLE ENVIRONMENTAL CONDITIONS!** See **Wind, Temperature and Humidity, and Temperature Inversions** sections of this label.

Controlling Droplet Size - General Techniques

- Volume** - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.
- Pressure** - Use the lower spray pressures recommended for the nozzle. Higher pressure reduces droplet size and does not improve canopy penetration. **WHEN HIGHER FLOW RATES ARE NEEDED, USE A HIGHER-CAPACITY NOZZLE INSTEAD OF INCREASING PRESSURE.**
- Nozzle Type** - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles.

Controlling Droplet Size - Aircraft

- Number of Nozzles** - Use the minimum number of nozzles with the highest flow rate that provide uniform coverage.
- Nozzle Orientation** - Orienting nozzles so that the spray is emitted backwards, parallel to the airstream will produce larger droplets than other orientations.
- Nozzle Type** - Solid stream nozzles (such as disc and core with swirl plate removed) oriented straight back produce larger droplets than other nozzle types.
- Boom Length** - The boom length should not exceed 3/4 of the wing or rotor length - longer booms increase drift potential.
- Application Height** - Application more than 10 ft above the canopy increases the potential for spray drift.

BOOM HEIGHT

Setting the boom at the lowest labeled height (if specified) which provides uniform coverage reduces the exposure of droplets to evaporation and wind. For ground equipment, the boom should remain level with the crop and have minimal bounce.

WIND

Drift potential increases at wind speeds of less than 3 mph (due to inversion potential) or more than 10 mph. However, many factors, including droplet size and equipment type determine drift potential at any given wind speed. **AVOID GUSTY OR WINDLESS CONDITIONS.**

Note: Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect spray drift.

TEMPERATURE AND HUMIDITY

When making applications in hot and dry conditions, set up equipment to produce larger droplets to reduce effects of evaporation.

TEMPERATURE INVERSIONS

Drift potential is high during a temperature inversion. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain close to the ground and move laterally in a concentrated cloud. Temperature inversions are characterized by increasing temperature with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

SHIELDED SPRAYERS

Shielding the boom or individual nozzles can reduce the effects of wind. However, it is the responsibility of the applicator to verify that the shields are preventing drift and not interfering with uniform deposition of the product.

USE PRECAUTIONS

Injury to or loss of desirable tree or other plants may result from failure to observe the following.

- If equipment is drained or flushed on or near desirable trees or other plants, or on areas where their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots.
- Treatment of powdery, dry soil or light, sandy soil when there is little likelihood of rainfall soon after treatment may result in off target movement and possible damage to susceptible crops when soil particles are moved by wind or water. Injury to crops may result if treated soil is washed, blown, or moved onto land used to produce crops. Exposure to ESCORT® may injure or kill most crops. Injury may be more severe when the crops are irrigated.
- Applications made where runoff water flows onto agricultural land may injure crops. Applications made during periods of intense rainfall, to soils saturated with water, surfaces paved with materials such as asphalt or concrete, or soils through which rainfall will not readily penetrate may result in runoff and movement of ESCORT®. Do not treat frozen soil. Treated soil should be left undisturbed to reduce the potential for ESCORT® movement by soil erosion due to wind or water.
- Do not use on lawns, walks, driveways, tennis courts or similar areas.
- Do not apply through any type of irrigation system.
- Do not use the equipment used to mix or apply ESCORT® on crops (except pasture, range and wheat). The mixing and application equipment may be used for noncrop areas and conifer plantations only.
- When used as directed, there is no grazing restriction for use rates of 1 2/3 ounce per acre and less. At use rates of 1 2/3 to 3 1/3 ounce per acre forage grasses may be cut for hay, fodder or green forage and fed to livestock, including lactating animals, 3 days after treatment.
- Do not use this product in the following counties of Colorado: Saguache, Rio Grande, Alamosa, Costilla and Conejos.
- Do not use this product in California.

STORAGE AND DISPOSAL

Storage: Store product in original container only. Do not contaminate water, other pesticides, fertilizer, food or feed in storage.

Product Disposal: Do not contaminate water, food or feed by disposal or cleaning of equipment. Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Container Disposal: Triple rinse (or equivalent) the container and then offer for recycling or reconditioning, or puncture and dispose of in a sanitary land fill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

¹Arsenal is a registered trademark of American Cyanamid Company.

²Accord is a registered trademark of Monsanto Company.

³Embark is a registered trademark of PBI Gordon Corporation.

⁴Garlon is a registered trademark of Dow Agrosciences.

⁵Tordon is a registered trademark of Dow Agrosciences.

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**LIMITATION OF
WARRANTY AND LIABILITY**

NOTICE: Read This Limitation of Warranty and Liability Before Buying or Using This Product. If the Terms Are Not Acceptable, Return the Product at Once, Unopened, and the Purchase Price Will Be Refunded.

It is impossible to eliminate all risks associated with the use of this product. Such risks arise from weather conditions, soil factors, off target movement, unconventional farming techniques, presence of other materials, the manner of use or application, or other unknown factors, all of which are beyond the control of DuPont. These risks can cause: ineffectiveness of the product; crop injury, or; injury to non-target crops or plants.

DuPont does not agree to be an insurer of these risks. **WHEN YOU BUY OR USE THIS PRODUCT, YOU AGREE TO ACCEPT THESE RISKS.**

DuPont warrants that this product conforms to the chemical description on the label thereof and is reasonably fit for the purpose stated in the Directions for Use, subject to the inherent risks described above, when used in accordance with the Directions for Use under normal conditions.

DUPONT MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS OR OF MERCHANTABILITY OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

IN NO EVENT SHALL DUPONT OR SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT. BUYER'S OR USER'S BARGAINED-FOR EXPECTATION IS CROP PROTECTION. THE EXCLUSIVE REMEDY OF THE USER OR BUYER AND THE EXCLUSIVE LIABILITY OF DUPONT OR SELLER, FOR ANY AND ALL CLAIMS, LOSSES, INJURIES OR DAMAGES (INCLUDING CLAIMS BASED ON BREACH OF WARRANTY OR CONTRACT, NEGLIGENCE, TORT OR STRICT LIABILITY), WHETHER FROM FAILURE TO PERFORM OR INJURY TO CROPS OR OTHER PLANTS, AND RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT, SHALL BE THE RETURN OF THE PURCHASE PRICE OF THE PRODUCT, OR AT THE ELECTION OF DUPONT OR SELLER, THE REPLACEMENT OF THE PRODUCT.

DuPont or its Ag Retailer must have prompt notice of any claim so that an immediate inspection of buyer's or user's growing crops can be made. Buyer and all users shall promptly notify DuPont or a DuPont Ag Retailer of any claims, whether based on contract, negligence, strict liability, other tort or otherwise or be barred from any remedy.

This Limitation of Warranty and Liability may not be amended by any oral or written agreement.

For product information call 1-888-6-DUPONT

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Specimen Label



Garlon^{*} 3A

Specialty Herbicide

*Trademark of Dow AgroSciences LLC

For the control of woody plants, broadleaf weeds and vines in forests and industrial non-crop areas, including manufacturing and storage sites, rights-of-way such as electrical power lines, communication lines, pipelines, roadsides, railroads, fence rows, non-irrigation ditch banks, and around farm buildings; including application to grazed areas, and establishment and maintenance of wildlife openings on these sites, and in Christmas tree plantations. Use within production forests and industrial non-crop sites may include applications to control target vegetation in and around standing water sites, such as marshes, wetlands, and the banks of ponds and lakes.

Active Ingredient:

triclopyr: 3,5,6-trichloro-2-pyridinylxyacetic acid, triethylamine salt	44.4%
Inert Ingredients	55.6%
Total.....	100.0%

Acid equivalent: triclopyr - 31.8% - 3 lb/gal

EPA Reg. No. 62719-37

Keep Out of Reach of Children

DANGER PELIGRO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

Precautionary Statements

Hazard to Humans and Domestic Animals

Corrosive • Causes Irreversible Eye Damage • Harmful If Swallowed Or Absorbed Through Skin • Prolonged Or Frequently Repeated Skin Contact May Cause Allergic Reaction In Some Individuals

Do not get in eyes or on skin or clothing.

Personal Protective Equipment (PPE)

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants
- Shoes plus socks
- Protective eyewear
- Chemical resistant gloves (\geq 14 mils) such as butyl rubber, natural rubber, neoprene rubber or nitrile rubber

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

Engineering Controls

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the WPS (40 CFR 170.240(d)(4-6), the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

First Aid

If in eyes: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

If on skin or clothing: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

If swallowed: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person. Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-992-5994 for emergency medical treatment information.

Note to Applicator: Allergic skin reaction is not expected from exposure to spray mixtures of Garlon 3A herbicide when used as directed.

Note to Physician: Probable mucosal damage may contraindicate the use of gastric lavage.

Environmental Hazards

Do not contaminate water when cleaning equipment or disposing of equipment washwaters. Under certain conditions, treatment of aquatic weeds can result in oxygen depletion or loss due to decomposition of dead plants, which may contribute to fish suffocation. This loss can cause fish suffocation. Therefore, to minimize this hazard, do not treat more than one-third to one-half of the water area in a single operation and wait at least 10 to 14 days between treatments. Begin treatment along the shore and proceed outwards in bands to allow fish to move into untreated areas. Consult with the State agency for fish and game before applying to public water to determine if a permit is needed.

This chemical has properties and characteristics associated with chemicals detected in groundwater. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

Physical or Chemical Hazards

Combustible. Do not use or store the product near heat or open flame.

Notice: Read the entire label. Use only according to label directions. **Before using this product, read Warranty Disclaimer, Inherent Risks of Use, and Limitation of Remedies elsewhere on this label.** If terms are unacceptable, return at once unopened.

In case of emergency endangering health or the environment involving this product, call 1-800-992-5994. If you wish to obtain additional product information, visit our web site at www.dowagro.com.

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read all Directions for Use carefully before applying.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your state or tribe, consult the agency responsible for pesticide regulation

Agricultural Use Requirements

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE), and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 48 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

- Coveralls
- Shoes plus socks
- Protective eyewear
- Chemical-resistant gloves (\geq 14 mils) such as butyl rubber, natural rubber, neoprene rubber or nitrile rubber

Non-Agricultural Use Requirements

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard for Agricultural Pesticides (40 CFR Part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries, or greenhouses.

Entry Restrictions for Non-WPS Uses: For applications to non-cropland areas, do not allow entry into areas until sprays have dried, unless applicator and other handler PPE is worn.

Storage and Disposal

Do not contaminate water, food, or feed by storage and disposal. Open dumping is prohibited.

Pesticide Storage: Store above 28°F or agitate before use.

Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Container Disposal for Refillable Containers: Seal all openings which have been opened during use. Return the empty container to a collection site designated by Dow AgroSciences. If the container has been damaged and cannot be returned according to the recommended procedures, contact Dow AgroSciences Customer Service Center at 1-800-258-1470 to obtain proper handling instructions.

Container Disposal (Metal): Do not reuse container. Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Container Disposal (Plastic): Do not reuse container. Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

General: Consult federal, state, or local disposal authorities for approved alternative procedures.

General Information for Production Forests and Industrial Non-Crop Areas

Garlon^{*} 3A specialty herbicide is recommended for the control of woody plants, broadleaf weeds and vines in forests and industrial non-crop areas including manufacturing and storage sites, rights-of-way such as electrical power lines, communication lines, pipelines, roadsides, railroads, fence rows, non-irrigation ditch banks, and around farm buildings, including application to grazed areas, and establishment and maintenance of wildlife openings on these sites, and in Christmas tree plantations. Use within production forests and industrial non-crop sites may include applications to control target vegetation in and around standing water sites, such as marshes, wetlands, and the banks of ponds and lakes.

Obtain Required Permits: Consult with appropriate state or local water authorities before applying this product to public waters. State or local public agencies may require permits.

General Use Precautions and Restrictions

In Arizona: The state of Arizona has not approved Garlon 3A for use on plants grown for commercial production, specifically forests grown for commercial timber production, or on designated grazing areas.

When applying this product in tank mix combination, follow all applicable use directions, precautions and limitations on each manufacturer's label.

Chemigation: Do not apply this product through any type of irrigation system.

Do not apply Garlon 3A directly to, or otherwise permit it to come into direct contact with grapes, tobacco, vegetable crops, flowers, or other desirable broadleaf plants, and do not permit spray mists containing it to drift into them.

It is permissible to treat non-irrigation ditch banks, seasonally dry wetlands (such as flood plains, deltas, marshes, swamps, or bogs) and transitional areas between upland and lowland sites.

- Do not apply to salt water bays or estuaries.
- Do not apply directly to un-impounded rivers or streams.
- Do not apply on ditches or canals used to transport irrigation water. It is permissible to treat non-irrigation ditch banks.
- Do not apply where runoff water may flow onto agricultural land as injury to crops may result.
- When making applications to control unwanted plants on banks or shorelines of moving water sites, minimize overspray to open water.
- The use of a mistblower is not recommended.
- Apply no more than 2 lb ae of triclopyr (2/3 gallon of Garlon 3A) per acre per growing season on range and pasture sites, including rights-of-way, fence rows or any area where grazing or harvesting is allowed.
- On forestry sites, Garlon 3A may be used at rates up to 6 lb ae of triclopyr (2 gallons of Garlon 3A) per acre per year.
- For all terrestrial use sites other than range, pasture, forestry sites, and grazed areas, the maximum application rate is 9 lb ae of triclopyr (3 gallons of Garlon 3A) per acre per year.

Precautions for Potable Water Intakes for Emerged Aquatic Weed Control

See chart below for specific setback distances near functioning potable water intakes. **Note:** Existing potable water intakes which are no longer in use, such as those replaced by potable water wells or connections to a municipal water system, are not considered to be functioning potable water intakes. These setback restrictions do not apply to terrestrial applications made adjacent to potable water intakes.

Area Treated (acres)	Garlon 3A Application Rate, qt/acre			
	2 qt/acre	4 qt/acre	6 qt/acre	8 qt/acre
	Setback Distance (ft)			
4	0	200	400	500
>4 - 8	0	200	700	900
>8 - 16	0	200	700	1000
>16	0	200	900	1300

To apply Garlon 3A around and within the distances noted above from a functioning potable water intake, the intake must be turned off until the triclopyr level in the intake water is determined to be 0.4 parts per million (ppm) or less by laboratory analysis or immunoassay.

- **Recreational Use of Water in Treatment Area:** There are no restrictions on use of water in the treatment area for recreational purposes, including swimming and fishing.
- **Livestock Use of Water from Treatment Area:** There are no restrictions on livestock consumption of water from the treatment area.

Grazing and Haying Restrictions

Except for lactating dairy animals, there are no grazing restrictions following application of this product.

- **Grazing Lactating Dairy Animals:** Do not allow lactating dairy animals to graze treated areas until the next growing season following application of this product.
- Do not harvest hay for 14 days after application.
- Grazed areas of non-cropland and forestry sites may be spot treated if they comprise no more than 10% of the total grazable area.

Slaughter Restrictions: During the season of application, withdraw livestock from grazing treated grass at least 3 days before slaughter.

Avoiding Injurious Spray Drift

Applications should be made only when there is little or no hazard from spray drift. Very small quantities of spray, which may not be visible, may seriously injure susceptible plants. Do not spray when wind is blowing toward susceptible crops or ornamental plants near enough to be injured. It is suggested that a continuous smoke column at or near the spray site or a smoke generator on the spray equipment be used to detect air movement, lapse conditions, or temperature inversions (stable air). If the smoke layers or indicates a potential of hazardous spray drift, do not spray.

Aerial Application: For aerial application on rights-of-way or other areas near susceptible crops, apply through a Microfoil[†] or Thru-Valve boom[†], or use an agriculturally labeled drift control additive. Other drift reducing systems or thickened sprays prepared by using high viscosity inverting systems may be used if they are made as drift-free as mixtures containing agriculturally labeled thickening agents or applications made with the Microfoil or Thru-Valve boom. Keep spray pressures low enough to provide coarse spray droplets. Spray boom should be no longer than 3/4 of the rotor length. Do not use a thickening agent with the Microfoil or Thru-Valve booms, or other systems that cannot accommodate thick sprays. Spray only when the wind velocity is low (follow state regulations). Avoid application during air inversions. If a spray thickening agent is used, follow all use recommendations and precautions on the product label.

[†] Reference within this label to a particular piece of equipment produced by or available from other parties is provided without consideration for use by the reader at its discretion and subject to the reader's independent circumstances, evaluation, and expertise. Such reference by Dow AgroSciences is not intended as an endorsement of such equipment, shall not constitute a warranty (express or implied) of such equipment, and is not intended to imply that other equipment is not available and equally suitable. Any discussion of methods of use of such equipment does not imply that the reader should use the equipment other than is advised in directions available from the equipment's manufacturer. The reader is responsible for exercising its own judgment and expertise, or consulting with sources other than Dow AgroSciences, in selecting and determining how to use its equipment.

Spray Drift Management

Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment and weather related factors determine the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions.

The following drift management requirements must be followed to avoid off-target drift movement from aerial applications:

1. The distance of the outer most operating nozzles on the boom must not exceed 3/4 the length of the rotor.
2. Nozzles must always point backward parallel with the air stream and never be pointed downwards more than 45 degrees.

Where states have more stringent regulations, they should be observed.

The applicator should be familiar with and take into account the information covered in the following Aerial Drift Reduction Advisory. [This information is advisory in nature and does not supersede mandatory label requirements.]

Aerial Drift Reduction Advisory

Information on Droplet Size: The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential, but will not prevent drift if applications are made improperly, or under unfavorable environmental conditions (see Wind, Temperature and Humidity, and Temperature Inversions).

Controlling Droplet Size:

- **Volume** - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.
- **Pressure** - Do not exceed the nozzle manufacturer's recommended pressures. For many nozzle types, lower pressure produces larger droplets. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.
- **Number of Nozzles** - Use the minimum number of nozzles that provide uniform coverage.
- **Nozzle Orientation** - Orienting nozzles so that the spray is released parallel to the airstream produces larger droplets than other orientations and is the recommended practice. Significant deflection from horizontal will reduce droplet size and increase drift potential.
- **Nozzle Type** - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid stream nozzles oriented straight back produce the largest droplets and the lowest drift.

Boom Length: For some use patterns, reducing the effective boom length to less than 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.

Application Height: Applications should not be made at a height greater than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe reduces exposure of droplets to evaporation and wind.

Swath Adjustment: When applications are made with a crosswind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by adjusting the path of the aircraft upwind. Swath adjustment distance should increase, with increasing drift potential (higher wind, smaller drops, etc.).

Wind: Drift potential is lowest between wind speeds of 2-10 mph. However, many factors, including droplet size and equipment type, determine drift potential at any given speed. Application should be avoided below 2 mph due to variable wind direction and high inversion potential. **Note:** Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect spray drift.

Temperature and Humidity: When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.

Temperature Inversions: Applications should not occur during a local, low level temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of the smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

Sensitive Areas: The pesticide should only be applied when the potential for drift to adjacent sensitive areas (e.g., residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).

Ground Equipment: To aid in reducing spray drift, Garlon 3A should be used in thickened (high viscosity) spray mixtures using an agriculturally labeled drift control additive, high viscosity invert system, or equivalent as directed by the manufacturer. With ground equipment, spray drift can be reduced by keeping the spray boom as low as possible; by applying 20 gallons or more of spray per acre; by keeping the operating spray pressures at the lower end of the manufacturer's recommended pressures for the specific nozzle type used (low pressure nozzles are available from spray equipment manufacturers); and by spraying when wind velocity is low (follow state regulations). In hand-gun applications, select the minimum spray pressure that will provide adequate plant coverage (without forming a mist). Do not apply with nozzles that produce a fine-droplet spray.

High Volume Leaf-Stem Treatment: To minimize spray drift, do not use pressure exceeding 50 psi at the spray nozzle and keep sprays no higher than brush tops. An agriculturally labeled thickening agent may be used to reduce drift.

Plants Controlled by Garlon 3A

Woody Plant Species

alder	Douglas-fir	poplar
arrowwood	dogwood	salt-bush (<i>Baccharis</i> spp.)
ash	elderberry	sassafras
aspen	elm	scotch broom
bear clover (bearmat)	gallberry	sumac
beech	hazel	sweetbay magnolia
birch	hornbean	sweetgum
blackberry	kudzu†	sycamore
blackgum	locust	tanoak
Brazilian pepper	madrone	thimbleberry
cascara	maples	tulip poplar
ceanothus	mulberry	waxmyrtle
cherry	oaks	western hemlock
chinquapin	persimmon	wild rose
choke cherry	pine	willow
cottonwood	poison ivy	winged elm
crataegus (hawthorn)	poison oak	salmonberry

†For complete control, retreatment may be necessary.

Annual and Perennial Broadleaf Weeds

bindweed	dandelion	ragweed
burdock	field bindweed	smartweed
Canada thistle	lambsquarter	tansy ragwort
chicory	plantain	vetch
curly dock	Purple loosestrife	wild lettuce

Application Methods

Use Garlon 3A at rates of 3/4 to 9 lb ae of triclopyr (1/4 to 3 gallons of Garlon 3A) per acre to control broadleaf weeds and woody plants. In all cases use the amount specified in enough water to give uniform and complete coverage of the plants to be controlled. Use only water suitable for spraying. Use of an agriculturally labeled non-ionic surfactant is recommended for all foliar applications. When using surfactants, follow the use directions and precautions listed on the surfactant manufacturer's label. Use the higher recommended concentrations of surfactant in the spray mixture when applying lower spray volumes per acre. The recommended order of addition to the spray tank is water, spray thickening agent (if used), additional herbicide (if used), and Garlon 3A. Surfactant should be added to the spray tank last or as recommended on the product label. If combined with emulsifiable concentrate herbicides, moderate continuous adequate agitation is required.

Before using any recommended tank mixtures, read the directions and all use precautions on both labels.

For best results, applications should be made when woody plants and weeds are actively growing. When hard to control species such as ash, blackgum, choke cherry, elm, maples, oaks, pines, or winged elm are prevalent and during applications made in late summer when the plants are mature and during drought conditions, use the higher rates of Garlon 3A alone or in combinations with Tordon* 101 Mixture herbicide. (Tordon 101 Mixture is a restricted use pesticide. See product label.)

When using Garlon 3A in combination with 2,4-D 3.8 lb amine, like DMA 4 IVM, or low volatile ester herbicides, generally the higher rates should be used for satisfactory brush control.

Use the higher dosage rates when brush approaches an average of 15 feet in height or when the brush covers more than 60% of the area to be treated. If lower rates are used on hard to control species, resprouting may occur the year following treatment.

On sites where easy to control brush species dominate, rates less than those recommended may be effective. Consult State or Local Extension personnel for such information.

Foliation Treatment With Ground Equipment

High Volume Foliation Treatment

For control of woody plants, use Garlon 3A at the rate of 3 to 9 lb ae of triclopyr (1 to 3 gallons of Garlon 3A) per 100 gallons of spray solution, or Garlon 3A at 3/4 to 3 lb ae of triclopyr (1 to 4 quarts of Garlon 3A) may be tank mixed with 1/4 to 1/2 gallons of 2,4-D 3.8 lb amine, like DMA 4 IVM, or low volatile ester or Tordon 101 Mixture and diluted to make 100 gallons of spray solution. Apply at a volume of 100 to 400 gallons of total spray per acre depending on size and density of woody plants. Coverage should be thorough to wet all leaves, stems, and root collars. (See General Use Precautions and Restrictions.) Do not exceed maximum allowable use rates per acre (see table below).

Maximum Labeled Rate versus Spray Volume per Acre

Total Spray Volume (gal/acre)	Maximum Rate of Garlon 3A		
	Rangeland and Pasture Sites [†] (gal/100 gal of spray)	Forestry Sites [‡] (gal/100 gal of spray)	Other Non-Cropland Sites ^{***} (gal/100 gal of spray)
400	Do not use	0.5	0.75
300	Do not use	0.67	1
200	Do not use	1	1.5
100	0.67	2	3
50	1.33	4	6
40	1.67	5	7.5
30	2.33	6.65	10
20	3.33	10	15
10	6.67	20	30

[†] Do not exceed the maximum use rate of 2 lb ae of triclopyr (2/3 gal of Garlon 3A)/acre/year.

[‡] Do not exceed the maximum use rate of 6 lb ae of triclopyr (2 gal of Garlon 3A)/acre/year.

^{***} Do not exceed the maximum use rate of 9 lb ae of triclopyr (3 gal of Garlon 3A)/acre/year on non-cropland use sites other than rangeland, pasture, forestry, and grazed areas.

Low Volume Foliage Treatment

To control susceptible woody plants, apply up to 15 lb ae of triclopyr (5 gallons of Garlon 3A) in 10 to 100 gallons of finished spray. The spray concentration of Garlon 3A and total spray volume per acre may be adjusted according to the size and density of target woody plants and kind of spray equipment used. With low volume sprays, use sufficient spray volume to obtain uniform coverage of target plants including the surfaces of all foliage, stems, and root collars (see General Use Precautions and Restrictions). For best results, a surfactant should be added to all spray mixtures. Match equipment and delivery rate of spray nozzles to height and density of woody plants. When treating tall, dense brush, a truck mounted spray gun with spray tips that deliver up to 2 gallons per minute at 40 to 60 psi may be required. Backpack or other types of specialized spray equipment with spray tips that deliver less than 1 gallon of spray per minute may be appropriate for short, low to moderate density brush.

Tank Mixing: As a low volume foliar spray, up to 9 lb ae of triclopyr (3 gallons of Garlon 3A) may be applied in tank mix combination with 1/2 to 1 gallon of Tordon K or 1 to 2 gallons of Tordon 101 Mixture in 10 to 100 gallons of finished spray.

Broadcast Applications With Ground Equipment

Make application using equipment that will assure uniform coverage of the spray volumes applied. To improve spray coverage, add an agriculturally labeled non-ionic surfactant as described later under Directions for Use. See Maximum Labeled Rate versus Spray Volume per Acre table above for relationship between mixing rate, spray volume and maximum application rate.

Woody Plant Control

Foliage Treatment: Use 6 to 9 lb ae of triclopyr (2 to 3 gallons of Garlon 3A) in enough water to make 20 to 100 gallons of total spray per acre or 1 1/2 to 3 lb ae of triclopyr (1/2 to 1 gallon of Garlon 3A) may be combined with 1 to 2 gallons of 2,4-D 3.8 lb amine, like DMA 4 IVM, or

low volatile esters or Tordon 101 Mixture in sufficient water to make 20 to 100 gallons of total spray per acre.

Broadleaf Weed Control

Use Garlon 3A at rates of 1 to 4 1/2 lb ae of triclopyr (1/3 to 1 1/2 gallons of Garlon 3A) in a total volume of 20 to 100 gallons of water per acre. Apply any time during the growing season. Garlon 3A at 1 to 3 lb ae of triclopyr (1/3 to 1 gallon of Garlon 3A) may be tank mixed with 1/2 to 1 gallon of Tordon K, Tordon 101 Mixture or 2,4-D 3.8 lb amine, like DMA 4 IVM, or low volatile herbicides to improve the spectrum of activity.

Aerial Application (Helicopter Only)

Aerial sprays should be applied using suitable drift control. (See General Use Precautions and Restrictions.) Add an agriculturally labeled non-ionic surfactant as described under Directions for Use. See Maximum Labeled Rate versus Spray Volume per Acre table above for relationship between mixing rate, spray volume and maximum application rate.

Foliage Treatment (Non-Grazed Rights-of-Way)

Non-grazed areas: Use 6 to 9 lb ae of triclopyr (2 to 3 gallons of Garlon 3A) or 3 to 4 1/2 lb ae of triclopyr (1 to 1 1/2 gallons of Garlon 3A) in a tank mix combination with 1 to 2 gallons of 2,4-D 3.8 lb amine, like DMA 4 IVM, or low volatile esters or Tordon 101 Mixture, and apply in a total spray volume of 10 to 30 gallons per acre. Use the higher rates and volumes when plants are dense or under drought conditions.

Interspersed areas in non-grazed rights-of-ways that may be subject to grazing may be spot treated if the treated area comprises no more than 10% of the total grazable area.

Forest Management Applications

For best control from broadcast applications of Garlon 3A, use a spray volume which will provide thorough plant coverage. Recommended spray volumes are usually 10 to 25 gallons per acre by air or 10 to 100 gallons per acre by ground. To improve spray coverage of spray volumes less than 50 gallons per acre, add an agriculturally labeled non-ionic surfactant as described under Directions for Use. Application systems should be used to prevent hazardous drift to off-target sites. Nozzles or additives that produce larger droplets of spray may require higher spray volumes to maintain brush control.

Forest Site Preparation (Not for Conifer Release)

Use up to 6 lb ae of triclopyr (2 gallons of Garlon 3A) and apply in a total spray volume of 10 to 30 gallons per acre or Garlon 3A at 3 to 4 1/2 lb ae of triclopyr (1 to 1 1/2 gallons of Garlon 3A) may be used with 1 to 2 gallons of Tordon 101 Mixture or 2,4-D 3.8 lb low volatile ester in a tank mix combination in a total spray volume of 10 to 30 gallons per acre. Use of a non-ionic agricultural surfactant is recommended for all foliar applications as described under Directions for Use.

Note: Conifers planted sooner than one month after treatment with Garlon 3A at less than 4 lb ae of triclopyr (1 1/3 gallons of Garlon 3A) per acre or sooner than two months after treatment at 4 to 9 lb ae of triclopyr (1 1/3 to 3 gallons of Garlon 3A) per acre may be injured. When tank mixtures of herbicides are used for forest site preparation, labels for all products in the mixture should be consulted and the longest recommended waiting period before planting observed.

Directed Spray Applications for Conifer Release

To release conifers from competing hardwoods such as red maple, sugar maple, striped maple, sweetgum, red and white oaks, ash, hickory, alder, birch, aspen, and pin cherry, mix 3 to 6 lb ae triclopyr (1 to 2 gallons of Garlon 3A) in enough water to make 100 gallons of spray mixture. To improve spray coverage, add an agriculturally labeled non-ionic surfactant as described under Directions for Use. The spray mixture should be directed onto foliage of competitive hardwoods using knapsack or backpack sprayers with flat fan nozzles or equivalent any time after hardwoods have reached full leaf size, but before autumn coloration. The majority of treated hardwoods should be less than 6 feet in height to ensure adequate spray coverage. Care should be taken to direct spray away from contact with conifer foliage, particularly foliage of desirable pines.

Note: Spray may cause temporary damage and growth suppression where contact with conifers occurs; however, injured conifers should recover and grow normally. Over-the-top spray applications can kill pines.

Broadcast Application for Conifer Release In the Northeastern United States

To release spruce, fir, red pine and white pine from competing hardwoods, such as red maple, sugar maple, striped maple, alder, birch (white, yellow or gray), aspen, ash, pin cherry and *Rubus* spp. and perennial and annual broadleaf weeds, use Garlon 3A at rates of 1 1/2 to 3 lb ae triclopyr (2 to 4 quarts of Garlon 3A) per acre alone or plus 2,4-D amine, like DMA 4 IVM, or 2,4-D ester to provide no more than 4 pounds acid equivalent per acre from both products. Applications should be made in late summer or early fall after conifers have formed their overwintering buds and hardwoods are in full leaf and prior to autumn coloration.

Broadcast Applications for Douglas Fir Release in the Pacific Northwest and California

To release Douglas fir from susceptible competing vegetation such as broadleaf weeds, alder, blackberry or Scotch broom, apply Garlon 3A at 1 to 1 1/2 lb ae triclopyr (1 1/3 to 2 quarts of Garlon 3A) per acre alone or in combination with 4 lb per acre of atrazine. Mix all sprays in a water carrier with a non-ionic surfactant. Applications should be made in early spring after hardwoods begin growth and before Douglas fir bud break ("early foliar" hardwood stage) or after Douglas fir seasonal growth has "hardened off" (set winter buds) in late summer, but while hardwoods are still actively growing. When treating after Douglas fir bud set, apply prior to onset of autumn coloration in hardwood foliage. **Note:** Treatments applied during active Douglas fir shoot growth (after spring bud break and prior to bud set) may cause injury to Douglas fir trees.

Cut Surface Treatments

To control unwanted trees of hardwood species such as elm, maple, oak and conifers in rights-of-way and other non-crop areas, apply Garlon 3A, either undiluted or diluted in a 1 to 1 ratio with water, as directed below.

With Tree Injector Method

Applications should be made by injecting 1/2 milliliter of undiluted Garlon 3A or 1 milliliter of the diluted solution through the bark at intervals of 3 to 4 inches between centers of the injector wound. The injections should completely surround the tree at any convenient height. **Note: No Worker Protection Standard worker entry restrictions or worker notification requirements apply when this product is injected directly into plants.**

With Hack and Squirt Method

Make cuts with a hatchet or similar equipment at intervals of 3 to 4 inches between centers at a convenient height around the tree trunk. Spray 1/2 milliliter of undiluted Garlon 3A or 1 milliliter of the diluted solution into each cut.

With Frill or Girdle Method

Make a single girdle through the bark completely around the tree at a convenient height. Wet the cut surface with undiluted or diluted solution.

Both of the above methods may be used successfully at any season except during periods of heavy sap flow of certain species - for example, maples.

Stump Treatment

Spray or paint the cut surfaces of freshly cut stumps and stubs with undiluted Garlon 3A. The cambium area next to the bark is the most vital area to wet.

Christmas Tree Plantations

Garlon 3A is recommended for the control of woody plants and annual and perennial broadleaf weeds in established Christmas tree plantations. For best results, applications should be made when woody plants and weeds are actively growing. Garlon 3A does not control weeds which have not emerged at the time of application. If lower rates are used on hard to control woody species, resprouting may occur the year following treatment. Brush over 8 feet tall is difficult to treat efficiently using hand equipment such as backpack or knapsack sprayers. When treating large brush or trees or hard to control species such as ash, blackgum, choke cherry, elm, hazel, madrone, maples, oaks or sweetgum, and for applications made during drought conditions or in late summer when the leaves are mature, use the higher rates of Garlon 3A or use cut surface application methods. For foliar applications, apply in enough water to give uniform and complete coverage of the plants to be controlled. Applications made under drought conditions may provide less than desirable results.

Use Precautions

- Do not use on newly seeded grass until well established as indicated by vigorous growth and development of secondary root system and tillering
- Newly seeded turf (alleyways, etc.) should be mowed two or three times before any treatment with Garlon 3A.
- Do not reseed Christmas tree areas treated with Garlon 3A for a minimum of three weeks after application.
- Do not use Garlon 3A if legumes, such as clover, are present and injury cannot be tolerated.

Spray Preparation

The recommended order of addition to the spray tank is water, drift control agent (if used), non-ionic agricultural surfactant and Garlon 3A. Continue moderate agitation while mixing and spraying. Use of a non-ionic agricultural surfactant is recommended for all applications. When using surfactants, follow use directions and precautions listed on the manufacturer's label. Use the higher recommended concentrations of surfactant in the spray mixture when applying lower spray volumes per acre.

Application

Make applications in late summer or early autumn after terminal growth of Christmas trees has hardened off, but before leaf drop off, target weeds. Apply at a rate of 3/4 to 1 3/4 lb ae triclopyr (2 to 5 pints of Garlon 3A) per acre as a foliar spray directed toward the base of Christmas trees. Use sufficient spray volume to provide uniform coverage of target plants (20 to 100 gallons per acre). **Do not apply with 2,4-D.** Application rates of Garlon 3A recommended for Christmas trees will only suppress some well established woody plants that are greater than 2 to 3 years old (see table below). Broadcast sprays may also be applied in bands between the rows of planted trees. Use spray equipment that will assure uniform coverage of the desired spray volume.

Spray solution from Garlon 3A can cause needle and branch injury to Christmas trees. To minimize injury to Christmas trees, it is recommended that sprays be directed so as to minimize contact with foliage. Blue spruce, white spruce, balsam fir and Frasier fir are less susceptible to injury than white pine and Douglas fir.

Restriction: Apply Garlon 3A only to established Christmas trees that were planted at least one full year prior to application.

Application Rates and Species Controlled:

Garlon 3A		
2 pints/acre (3/4 lb ae triclopyr)	3 to 4 pints/acre (1 1/2 lb ae triclopyr)	5 pints/acre (1 3/4 lb ae triclopyr)
clover	bindweed, field (TG)	arrowwood (SDL)
dandelion	blackberry [†]	aspen
dock, curly	chicory (S)	beech (SDL)
lambsquarters	fireweed	birch (SDL)
lespedeza	ivy, ground	chinquapin
plantain, broadleaf	lettuce, wild	cottonwood (SDL)
plantain, buckhorn	oxalis	elderberry
ragweed, common	poison ivy	grape, wild
vetch	smartweed (TG)	mulberry (SDL)
	thistle, Canada (TG)	poplar (SDL)
	violet, wild	sassafras (SDL)
	Virginia creeper [†]	sumac (SDL)
		sycamore (SDL)

(TG) Top growth control, retreatment may be necessary

(S) Suppression

(SDL) Seedlings less than 2-3 years old

[†]Use 4 pint per acre rate

Directed Applications

To control hardwoods such as red maple, sugar maple, striped maple, sweetgum, red and white oaks, ash, alder, birch, aspen, and pin cherry mix 4 to 20 fluid ounces of Garlon 3A in enough water to make 3 gallons of spray mixture. For directed applications, do not exceed 6 lb ae triclopyr (2 gallons of Garlon 3A) per acre per year. To improve coverage, add a non-ionic agricultural surfactant to the spray. This spray mixture should be directed onto foliage of competitive hardwoods using knapsack or backpack sprayers with flat fan nozzles or equivalent any time after hardwoods have reached full leaf size, but before autumn coloration (when plants are actively growing). The majority of treated hardwoods should be less than 8 feet in height to ensure adequate spray coverage. **Note:** To prevent Christmas tree injury, care should be taken to direct spray away from contact with Christmas tree foliage.

Cut Surface Treatments

When treating large brush or trees or hard to control species such as ash, blackgum, choke cherry, elm, hazel, madrone, maples, oaks or sweetgum, and for applications made during drought conditions or in late summer when the leaves are mature, use cut surface treatments. (See directions for Cut Surface Treatments in preceding section of this label.)

Wetland Sites in Production Forests and Industrial Non-Crop Areas

Garlon 3A may be used within production forests and industrial non-crop sites to control target vegetation in and around standing water sites, such as marshes, wetlands, and the banks of ponds and lakes and transition areas between upland and lowland sites.

For control of woody plants and broadleaf weeds in these sites, follow use directions and application methods on this label for forestry and terrestrial non-cropland sites.

Use Precautions

Minimize overspray to open water when treating target vegetation in and around non-flowing, quiescent or transient water. When making applications to control unwanted plants on banks or shorelines of flowing water, minimize overspray to open water. **Note:** Consult local public water control authorities before applying this product in and around public water. Permits may be required to treat such areas.

Terms and Conditions of Use

If terms of the following Warranty Disclaimer, Inherent Risks of Use, and Limitation of Remedies are not acceptable, return unopened package at once to the seller for a full refund of purchase price paid. Otherwise, use by the buyer or any other user constitutes acceptance of the terms under Warranty Disclaimer, Inherent Risks of Use and Limitations of Remedies.

Warranty Disclaimer

Dow AgroSciences warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. Dow AgroSciences MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

Inherent Risks of Use

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable temperature, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of Dow AgroSciences or the seller. All such risks shall be assumed by buyer.

Limitation of Remedies

The exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories), shall be limited to, at Dow AgroSciences' election, one of the following:

1. Refund of purchase price paid by buyer or user for product bought, or
2. Replacement of amount of product used.

Dow AgroSciences shall not be liable for losses or damages resulting from handling or use of this product unless Dow AgroSciences is promptly notified of such loss or damage in writing. In no case shall Dow AgroSciences be liable for consequential or incidental damages or losses.

The terms of the Warranty Disclaimer, Inherent Risks of Use, and this Limitation of Remedies cannot be varied by any written or verbal statements or agreements. No employee or sales agent of Dow AgroSciences or the seller is authorized to vary or exceed the terms of the Warranty Disclaimer or this Limitation of Remedies in any manner.

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Dow AgroSciences LLC • Indianapolis, IN 46268 U.S.A.

Label Code: D02-101-037

Replaces Label: D02-101-036

LOES Number: 010-00084

EPA-Accepted 12/03/02

Revisions:

1. Corrected Example Calculation 2 on page 10: = $(800 \times 3.912) - 160/3.33$.

Specimen Label



Garlon^{*} 4

Specialty Herbicide

*Trademark of Dow AgroSciences LLC

For the control of woody plants and broadleaf weeds on rights-of-way, industrial sites, non-crop areas, non-irrigation ditch banks, forests, and wildlife openings, including grazed areas on these sites.

Active Ingredient:

triclopyr: 3,5,6-trichloro-2-pyridinylxyacetic acid, butoxyethyl ester	61.6%
Inert Ingredients	38.4%
Total	100.0%

Contains petroleum distillates

Acid Equivalent:
triclopyr - 44.3% - 4 lb/gal

EPA Reg. No. 62719-40

Precautionary Statements

Hazards to Humans and Domestic Animals

Keep Out of Reach of Children

CAUTION PRECAUCION

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

Harmful If Swallowed, Inhaled, Or Absorbed Through Skin

Avoid contact with eyes, skin, or clothing. Avoid breathing mists or vapors. Avoid contamination of food.

Personal Protective Equipment (PPE)

Some materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for category E on an EPA chemical resistance category selections chart.

WPS Uses: Applicators and other handlers who handle this pesticide for any use covered by the Worker Protection Standard (40 CFR Part 170) -- in general, agricultural-plant uses are covered -- must wear:

- Long-sleeved shirt and long pants
- Chemical-resistant gloves such as Barrier Laminate, Nitrile Rubber, Neoprene Rubber, or Viton
- Shoes plus socks

Non-WPS Uses: Applicators and other handlers who handle this pesticide for any use NOT covered by the Worker Protection Standard (40 CFR Part 170) -- in general, only agricultural-plant uses are covered by the WPS -- must wear:

- Long-sleeved shirt and long pants
- Shoes plus socks

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

User Safety Recommendations

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

First Aid

If on skin: Flush skin with plenty of water. Get medical attention if irritation persists.

If swallowed: Do not induce vomiting. Call a physician.

Environmental Hazards

This pesticide is toxic to fish. Do not apply directly to water, to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters.

Physical or Chemical Hazards

Do not use or store near heat or open flame. Do not cut or weld container.

Notice: Read the entire label. Use only according to label directions. Before buying or using this product, read "Warranty Disclaimer" and "Limitation of Remedies" elsewhere on this label.

In case of emergency endangering health or the environment involving this product, call 1-800-992-5994. If you wish to obtain additional product information, visit our web site at www.dowagro.com.

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read all Directions for Use carefully before applying.

Do not use for manufacturing or formulating.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your state or tribe, consult the agency responsible for pesticide regulation.

Agricultural Use Requirements

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

- Coveralls
- Chemical-resistant gloves such as Barrier Laminate, Nitrile Rubber, Neoprene Rubber, or Viton
- Shoes plus socks

Storage and Disposal

Do not contaminate water, food, or feed by storage or disposal. Open dumping is prohibited.

Storage: Store above 28°F or agitate before use.

Pesticide Disposal: Pesticide, spray mixture, or rinse water that cannot be used according to label instructions must be disposed of according to applicable federal, state, or local procedures.

Plastic Container Disposal: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

Metal Container Disposal: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Container Disposal for Refillable Containers: Replace the dry disconnect cap, if applicable, and seal all openings which have been opened during use. Return the empty container to a collection site designated by Dow AgroSciences. If the container has been damaged and cannot be returned according to the recommended procedures, contact the Dow AgroSciences Customer Service Center at 1-800-258-1470 to obtain proper handling instructions.

General: Consult federal, state, or local disposal authorities for approved alternative procedures.

General Information

Garlon[®] 4 herbicide is recommended for the control of unwanted woody plants and annual and perennial broadleaf weeds in forests, and on non-crop areas including industrial manufacturing and storage sites, rights-of-way such as electrical power lines, communication lines, pipelines, roadsides and railroads, fence rows, non-irrigation ditch banks, and around farm buildings. Use on these sites may include application to grazed areas as well as establishment and maintenance of wildlife openings.

General Use Precautions

Agricultural Use Requirements for Forestry Uses: For use of this product on forestry sites, follow PPE and Reentry restrictions in the Agricultural Use Requirements section of this label.

Use Requirements for Non-cropland Areas: No Worker Protection Standard worker entry restrictions or worker notification requirements apply when this product is applied to non-cropland.

In Arizona: The state of Arizona has not approved Garlon 4 for use on plants grown for commercial production; specifically forests grown for commercial timber production, or on designated grazing areas.

Chemigation: Do not apply this product through any type of irrigation system.

Other Precautions:

- When applying this product in tank mix combination, follow all applicable use directions and precautions on each manufacturer's label.
- Do not apply on ditches used to transport irrigation water. Do not apply where runoff or irrigation water may flow onto agricultural land as injury to crops may result.
- Do not apply this product using mist blowers unless a drift control additive, high viscosity inverting system, or equivalent is used to control spray drift.
- Sprays applied directly to Christmas trees may result in conifer injury. When treating unwanted vegetation in Christmas tree plantations, care should be taken to direct sprays away from conifers.
- Do not apply Garlon 4 directly to, or otherwise permit it to come into direct contact with grapes, tobacco, vegetable crops, flowers, or other desirable broadleaf plants and do not permit spray mists containing it to drift onto them.
- It is permissible to treat non-irrigation ditch banks, seasonally dry wetlands, flood plains, deltas, marshes, swamps, bogs, and transitional areas between upland and lowland sites. Do not apply to open water such as lakes, reservoirs, rivers, streams, creeks, salt water bays, or estuaries.

Avoid Injurious Spray Drift

Applications should be made only when there is little or no hazard from spray drift. Very small quantities of spray, which may not be visible may seriously injure susceptible plants. Do not spray when wind is blowing toward susceptible crops or ornamental plants near enough to be injured. It is suggested that a continuous smoke column at or near the spray site or a smoke generator on the spray equipment be used to detect air movement, lapse conditions, or temperature inversions (stable air). If the smoke layers or indicates a potential of hazardous spray drift, do not spray.

Aerial Application (Helicopter Only): For aerial application on rights-of-way or other areas near susceptible crops, use an agriculturally registered spray thickening drift control additive as recommended by the manufacturer or apply through the Microfoil[†] boom, Thru-Valve boom, or equivalent drift control system. Thickened sprays prepared by using high viscosity invert systems or other drift reducing systems may be utilized if they are made as drift-free as are mixtures containing an agriculturally registered thickening agent or applications made with the Microfoil boom or Thru Valve boom. If a spray thickening agent is used, follow all use recommendations and precautions on the product label. Do not use a thickening agent with the Microfoil boom, Thru Valve boom, or other systems that cannot accommodate thick sprays.

[†]Reference within this label to a particular piece of equipment produced by or available from other parties is provided without consideration for use by the reader at its discretion and subject to the reader's independent circumstances, evaluation, and expertise. Such reference by Dow AgroSciences is not intended as an endorsement of such equipment, shall not constitute a warranty (express or implied) of such equipment, and is not intended to imply that other equipment is not available and equally suitable. Any discussion of methods of use of such equipment does not imply that the reader should use the equipment other than is advised in directions available from the equipment's manufacturer. The reader is responsible for exercising its own judgment and expertise, or consulting with sources other than Dow AgroSciences, in selecting and determining how to use its equipment.

With aircraft, drift can be lessened by applying a coarse spray; by using a spray boom no longer than 3/4 the rotor length; by spraying only when wind velocities are low; or by using an approved drift control system. Keep operating spray pressures at the lower end of the manufacturer's recommended pressures for the specific nozzle type used. Low pressure nozzles are available from spray equipment manufacturers. Select nozzles and pressures which provide adequate plant coverage, but minimize the production of fine spray particles.

Ground Equipment: To aid in reducing spray drift potential when making ground applications near susceptible crops or other desirable broadleaf plants, Garlon 4 should be applied through large droplet producing equipment, such as the Radiarc sprayer or in thickened spray mixtures using an agriculturally registered drift control additive, or high viscosity invert systems. When using a spray thickening or inverting additive, follow all use directions and precautions on the product label. With ground equipment, spray drift can be reduced by keeping the spray boom as low as possible; by applying 20 gallons or more of spray per acre; and by spraying when wind velocity is low. Do not apply with nozzles that produce a fine droplet spray. Keep operating spray pressures at the lower end of the manufacturer's recommended pressures for the specific nozzle type used. Low pressure nozzles are available from spray equipment manufacturers. Select nozzles and pressures which provide adequate plant coverage, but minimize the production of fine spray particles.

High Volume Leaf-Stem Treatment: To minimize spray drift, keep sprays no higher than brush tops and keep spray pressures low enough to provide coarse spray droplets. A spray thickening agent may be used to reduce spray drift.

Grazing and Haying Restrictions

Grazing or harvesting green forage:

- 1) Lactating dairy animals
 - Two quarts per acre or less: Do not graze or harvest green forage from treated area for 14 days after treatment.
 - Greater than 2 to 6 quarts per acre: Do not graze or harvest green forage until the next growing season.
- 2) Other Livestock
 - Two quarts per acre or less: No grazing restrictions.
 - Greater than 2 to 6 quarts per acre: Do not graze or harvest green forage from treated area for 14 days after treatment. **Note:** If less than 25% of a grazed area is treated, there is no grazing restriction.

Haying (harvesting of dried forage):

- 1) Lactating dairy animals
 - Do not harvest hay until the next growing season.
- 2) Other Livestock
 - Two quarts per acre or less: Do not harvest hay for 7 days after treatment.

Greater than 2 to 4 quarts per acre: Do not harvest hay for 14 days after treatment.

Greater than 4 quarts per acre: Do not harvest hay until the next growing season.

Slaughter Restrictions:

Withdraw livestock from grazing treated grass or consumption of treated hay at least 3 days before slaughter. This restriction applies to grazing during the season following treatment or hay harvested during the season following treatment.

Plants Controlled by Garlon 4

Woody Plants Controlled

alder	chinquapin	madrone	scotch broom
arrowwood	choke cherry	maples	sumac
ash	cottonwood	mulberry	sweetbay magnolia
aspen	<i>Crataegus</i> (hawthorn)	oaks	sweetgum
bear clover (bearmat)	dogwood	persimmon	sycamore
beech	Douglas-fir	pine	tanoak
birch	elderberry	poison ivy	thimbleberry
blackberry	elm	poison oak	tree-of-heaven
blackgum	gallberry	poplar	<i>(Ailanthus)</i> †
boxelder	gorse	salmonberry	tulip poplar
Brazilian pepper	hazel	salt-bush	wax myrtle
buckthorn	hickory		wild rose
		(<i>Bracharis</i> spp.)	
cascara	hornbeam	salt-cedar†	willow
Ceanothus	kudzu††	sassafras	winged elm
cherry	locust		

† For best control, use either a basal bark or cut stump treatment.

†† For complete control, retreatment may be necessary.

Annual and Perennial Broadleaf Weeds Controlled

black medic	curly dock	matchweed	sweet clover
bull thistle	dandelion	mustard	vetch
burdock	field bindweed	Oxalis	wild carrot
Canada thistle	goldenrod	plantain	(Queen Anne's lace)
chicory	ground ivy	purple loosestrife	wild lettuce
clover	lambsquarters	ragweed	wild violet
creeping beggarweed	lespedeza	smartweed	yarrow

Table 1 (Maximum Application Rate): The following table is provided as a guide to the user to achieve the proper rate of Garlon 4 without exceeding the maximum use rate of 8 quarts per acre:

Spray Volume Per Acre	Quarts of Garlon 4 Per 100 Gallons of Spray (Not to Exceed 8 qt/Acre)
400	2
300	2.7
200	4
100	8
50	16
20	40
10	80

Approved Uses

Foliar Applications

Use Garlon 4 at rates of 1 to 8 quarts per acre to control broadleaf weeds and woody plants. In all cases use the amount specified in enough water to give uniform and complete coverage of the plants to be controlled. The recommended order of addition to the spray tank is water, spray thickening agent (if used), surfactant (if used), additional herbicide (if used), and Garlon 4. If a standard agricultural surfactant is used, use at a rate of 1 to 2 quarts per acre. Use continuous adequate agitation.

Before using any recommended tank mixtures, read the directions and all precautions on both labels.

For best results applications should be made when woody plants and weeds are actively growing. When hard-to-control species such as ash, blackgum, choke cherry, elm, maples (other than vine or big leaf), oaks, pines, or winged elm are prevalent, and during applications made during late summer when the plants are mature, or during drought conditions, use the higher rates of Garlon 4 alone or in combination with Tordon* 101 Mixture herbicide.

When using Garlon 4 in combination with 3.8 pounds per gallon 2,4-D low volatile ester herbicide generally the higher rates should be used for satisfactory brush control.

Use the higher dosage rates when brush approaches an average of 15 feet in height or when the brush covers more than 60% of the area to be treated. If lower rates are used on hard-to-control species, resprouting may occur the year following treatment.

On sites where easy to control brush species dominate, rates less than those recommended may be effective. Consult state or local extension personnel for such information.

Foliar Treatment With Ground Equipment

High Volume Foliar Treatment

For control of woody plants, use Garlon 4 at the rate of 1 to 3 quarts per 100 gallons of spray mixture, or Garlon 4 at 1 to 3 quarts may be tank mixed with labeled rates of 2,4-D low volatile ester herbicide, Tordon 101 Mixture herbicide, or Tordon K herbicide and diluted to make 100 gallons of spray. Apply at a volume of 100 to 400 gallons of total spray per acre depending on size and density of woody plants. Coverage should be thorough to wet all leaves, stems, and root collars. See Table 1 for relationship between spray volume and maximum application rate. When tank mixing, follow applicable use directions and precautions on each manufacturer's label.

Low Volume Foliar Treatment

To control susceptible woody plants, mix up to 20 quarts of Garlon 4 in 10 to 100 gallons of finished spray. The spray concentration of Garlon 4 and total spray volume per acre should be adjusted according to the size and density of target woody plants and kind of spray equipment used. With low volume sprays, use sufficient spray volume to obtain uniform coverage of target plants including the surfaces of all foliage, stems, and root collars (See General Use Precautions). For best results, a surfactant should be added to all spray mixtures. Match equipment and delivery rate of spray nozzles to height and density of woody plants. When treating tall, dense brush, a truck mounted spray gun with spray tips that deliver up to 2 gallons per minute at 40 to 60 psi may be required. Backpack or other types of specialized spray equipment with spray tips that deliver less than 1 gallon of spray per minute may be appropriate for short, low to moderate density brush. See Table 1 for relationship between mixing rate, spray volume and maximum application rate.

Tank Mixing: As a low volume foliar spray, up to 12 quarts of Garlon 4 may be applied in tank mix combination with labeled rates of Tordon K or Tordon 101 Mixture in 10 to 100 gallons of finished spray.

Broadcast Applications With Ground Equipment

Make application using equipment that will assure thorough and uniform coverage at spray volumes applied.

Woody Plant Control

Foliation Treatment: Use 4 to 8 quarts of Garlon 4 in enough water to make 5 or more gallons per acre of total spray, or Garlon 4 at 1 1/2 to 3 quarts may be combined with labeled rates of 2,4-D low volatile ester, Tordon 101 Mixture, or Tordon K in sufficient water to make 5 or more gallons per acre of total spray.

Broadleaf Weed Control

Use Garlon 4 at rates of 1 to 4 quarts in a total volume of 5 or more gallons per acre as a water spray mixture. Apply at any time weeds are actively growing. Garlon 4 at 0.25 to 3 quarts may be tank mixed with labeled rates of 2,4-D amine or low volatile ester, Tordon K, or Tordon 101 Mixture to improve the spectrum of activity. For thickened (high viscosity) spray mixtures, Garlon 4 can be mixed with diesel oil or other inverting agent. When using an inverting agent, read and follow the use directions and precautions on the product label.

Aerial Application (Helicopter Only)

Aerial sprays should be applied using suitable drift control (See "General Use Precautions").

Foliation Treatment (Utility and Pipeline Rights-of-Way)

Use 4 to 8 quarts of Garlon 4 alone, or 3 to 4 quarts Garlon 4 in a tank mix combination with labeled rates of 2,4-D low volatile ester Tordon 101 Mixture or Tordon K and apply in a total spray volume of 10 to 30 gallons per acre. Use the higher rates and volumes when plants are dense or under drought conditions.

Basal Bark and Dormant Brush Treatments

To control susceptible woody plants in rights-of-way, and other non-crop areas, and in forests, use Garlon 4 in oil or oil-water mixtures prepared and applied as described below. When preparing mixtures, use as oils either a commercially available basal oil, diesel fuel, No. 1 or No. 2 fuel oil, or kerosene. Substitute other oils or diluents only as recommended by the oil or diluent's manufacturer. When mixing with a basal oil or other oils or diluents, read and follow the use directions and precautions on the product label prepared by the oil or diluent's manufacturer.

Oil Mixture Sprays

Add Garlon 4 to the required amount of oil in the spray tank or mixing tank and mix thoroughly. If the mixture stands over 4 hours, reagitation is required.

Oil Mixtures of Garlon 4 and Tordon K: Tordon K and Garlon 4 may be used in tank mix combination for basal bark treatment of woody plants.

These herbicides are incompatible and will not form a stable mixture when mixed together directly in oil. Stable tank mixtures for basal bark application can be made if each product is first combined with a compatibility agent prior to final mixing in the desired ratio.

(See product bulletin for mixing instructions.)

Oil-Water Mixture Sprays

First, premix the Garlon 4, oil and surfactant in a separate container. Do not allow any water or mixtures containing water to get into the Garlon 4 or the premix. Fill the spray tank about half full with water, then slowly add the premix with continuous agitation and complete filling the tank with water. Continue moderate agitation.

Note: If the premix is put in the tank without any water, the first water added may form a thick "invert" (water in oil) emulsion which will be hard to break.

Basal Bark Treatment

To control susceptible woody plants with stems less than 6 inches in basal diameter, mix 1 to 5 gallons of Garlon 4 in enough oil to make 100 gallons of spray mixture. Apply with knapsack sprayer or power spraying equipment using low pressure (20-40 psi). Spray the basal parts of brush and tree trunks to a height of 12 to 15 inches from the ground. Thorough wetting of the indicated area is necessary for good control. Spray until runoff at the ground line is noticeable. Old or rough bark requires more spray than smooth young bark. Apply at any time, including the winter months, except when snow or water prevent spraying to the ground line.

Low Volume Basal Bark Treatment

To control susceptible woody plants with stems less than 6 inches in basal diameter, mix 20 to 30 gallons of Garlon 4 in enough oil to make 100 gallons of spray mixture. Apply with a backpack or knapsack sprayer using low pressure and a solid cone or flat fan nozzle. Spray the basal parts of brush and tree trunks in a manner which thoroughly wets the lower stems, including the root collar area, but not to the point of runoff. Herbicide concentration should vary with size and susceptibility of species treated. Apply at any time, including the winter months, except when snow or water prevent spraying to the ground line or when stem surfaces are saturated with water.

Garlon 4 Plus Tordon K in Oil Tank Mix: Garlon 4 and Tordon K may be applied as a low volume basal bark treatment to improve control of certain woody species such as ash, elm, maple, poplar, aspen, hackberry, oak, oceanspray, birch, hickory, pine, tanoak, cherry, locust, sassafras, and multiflora rose. (See product bulletin for mixing instructions.)

Streamline Basal Bark Treatment (Southern States)

To control or suppress susceptible woody plants for conifer release, mix 20 to 30 gallons of Garlon 4 in enough oil to make 100 gallons of spray mixture. Apply with a backpack or knapsack sprayer using equipment which provides a directed straight stream spray. Apply sufficient spray to one side of stems less than 3 inches in basal diameter to form a treated zone that is 6 inches in height. When the optimum amount of spray mixture is applied, the treated zone should widen to encircle the stem within approximately 30 minutes. Treat both sides of stems which are 3 to 4 inches in basal diameter. Direct the spray at bark that is approximately 12 to 24 inches above ground. Pines (loblolly, slash, shortleaf, and Virginia) up to 2 inches in diameter breast height (dbh) can be controlled by directing the spray at a point approximately 4 feet above ground. Vary spray mixture concentration with size and susceptibility of the species being treated. Best results are achieved when

applications are made to young vigorously growing stems which have not developed the thicker bark characteristic of slower growing, understory trees in older stands. This technique is not recommended for scrub and live oak species, including blackjack, turkey, post, live, bluejack and laurel oaks, or bigleaf maple. Apply from approximately 6 weeks prior to hardwood leaf expansion in the spring until approximately 2 months after leaf expansion is completed. Do not apply when snow or water prevent spraying at the desired height above ground level.

Low Volume Stem Bark Band Treatment (North Central and Lake States)

To control susceptible woody plants with stems less than 6 inches in basal diameter, mix 20 to 30 gallons of Garlon 4 in enough oil to make 100 gallons of spray mixture. Apply with a backpack or knapsack sprayer using low pressure and a solid cone or flat fan nozzle. Apply the spray in a 6 to 10 inch wide band that completely encircles the stem. Spray in a manner that completely wets the bark, but not to the point of runoff. The treatment band may be positioned at any height up to the first major branch. For best results apply the band as low as possible. Spray mixture concentration should vary with size and susceptibility of species to be treated. Applications may be made at any time, including winter months.

Thinline Basal Bark Treatment

To control susceptible woody plants with stems less than 6 inches in diameter, apply Garlon 4 either undiluted or mixed at 50-75% v/v with oil in a thin stream to all sides of the lower stems. The stream should be directed horizontally to apply a narrow band around each stem or clump. Use a minimum of 2 to 15 milliliters of Garlon 4 or oil mixture with Garlon 4 to treat single stems and from 25 to 100 milliliters to treat clumps of stems. Use an applicator metered or calibrated to deliver the small amounts required.

Dormant Stem Treatment

Dormant stem treatments will control susceptible woody plants and vines with stems less than 2 inches in diameter. Plants with stems greater than 2 inches in diameter may not be controlled and resprouting may occur. This treatment method is best suited for sites with dense, small diameter brush. Dormant stem treatments of Garlon 4 can also be used as a chemical side-trim for controlling lateral branches of larger trees that encroach onto roadside, utility, or other rights-of-way.

Mix 4 to 8 quarts of Garlon 4 in 2 to 3 gallons of crop oil concentrate or other recommended oil and add this mixture to enough water to make 100 gallons of spray solution. Use continuous adequate agitation. Apply with Radiarc, OC or equivalent nozzles, or handgun using 70 to 100 gallons of spray per acre to ensure uniform coverage of stems. Garlon 4 may be mixed with 4 quarts of Weedone 170 herbicide to improve the control of black cherry and broaden the spectrum of herbicidal activity. In western states, apply anytime after woody plants are dormant. In other areas apply anytime within 10 weeks of budbreak, generally February through April. Do not apply to wet or saturated bark as poor control may result.

Cut Stump Treatment

To control resprouting of cut stumps of susceptible species, mix 20 to 30 gallons of Garlon 4 in enough oil to make 100 gallons of spray mixture. Apply with a backpack or knapsack sprayer using low pressures and a solid cone or flat fan nozzle. Spray the root collar area, sides of the stump, and the outer portion of the cut surface including the cambium until thoroughly wet, but not to the point of runoff. Spray mixture concentration should vary with size and susceptibility of species treated. Apply at any time, including in winter months, except when snow or water prevent spraying to the ground line.

Treatment of Cut Stumps in Western States

To control resprouting of salt-cedar and other *Tamarix* species, bigleaf maple, tanoak, Oregon myrtle, and other susceptible species, apply undiluted

Garlon 4 to wet the cambium and adjacent wood around the entire circumference of the cut stump. Treatments may be applied throughout the year; however, control may be reduced with treatment during periods of moisture stress as in late summer. Use an applicator which can be calibrated to deliver the small amounts of material required.

Note: All basal bark and dormant brush treatment methods may be used to treat susceptible woody species on range and permanent pasture land provided that no more than 1.5 quarts of Garlon 4 are applied per acre. Large plants or species requiring higher rates of Garlon 4 may not be completely controlled.

Forest Management Applications

For broadcast applications apply the recommended rate of Garlon 4 in a total spray volume of 5 to 25 gallons per acre by air or 10 to 100 gallons per acre by ground. Use spray volumes sufficient to provide thorough coverage of treated foliage. Use application systems designed to prevent spray drift to off-target sites. Nozzles or additives that produce larger droplets may require higher spray volumes to provide adequate coverage.

Plant Back Interval for Conifers: Conifers planted sooner than 1 month after treatment with Garlon 4 at less than 4 quarts per acre or sooner than 2 months after treatment at 4 to 8 quarts per acre may be injured. When tank mixtures of herbicides are used for forest site preparation, labels for all products in the mixture should be consulted and the longest recommended waiting period observed.

Broadcast Treatments for Forest Site Preparation (Not For Conifer Release)

Southern States Including Alabama, Arkansas, Delaware, Florida, Georgia, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia: To control susceptible woody plants and broadleaf weeds, apply Garlon 4 at a rate of 4 to 8 quarts per acre. To broaden the spectrum of woody plants and broadleaf weeds controlled, apply 2 to 4 quarts per acre of Garlon 4 in tank mix combination with labeled rates of Tordon 101 Mixture or Tordon K. Tordon 101 Mixture and Tordon K are not registered for use in the states of California and Florida. Where grass control is also desired, Garlon 4, alone or in combination with Tordon K or Tordon 101 Mixture, may be tank mixed with labeled rates of other herbicides registered for grass control in forests. Use of tank mix products must be in accordance with the most restrictive of label limitations and precautions. No label application rates should be exceeded. Garlon 4 cannot be tank mixed with any product containing a label prohibition against such mixing.

In Western, Northeastern, North Central, and Lake States (States Not Listed Above As Southern States): To control susceptible woody plants and broadleaf weeds, apply Garlon 4 at a rate of 3 to 6 quarts per acre. To broaden the spectrum of woody plants and broadleaf weeds controlled, apply 1.5 to 3.0 quarts per acre of Garlon 4 in tank mix combination with labeled rates of Tordon 101 Mixture, Tordon K, or 2,4-D low volatile ester. Tordon 101 Mixture and Tordon K are not registered for use in the states of California and Florida. Where grass control is also desired, Garlon 4, alone or in tank mix combination with Tordon 101 Mixture or Tordon K, may be applied with labeled rates of other herbicides registered for grass control in forests. When applying tank mixes, follow applicable use directions and precautions on each product label.

Applications for Site Preparation In Southern Coastal Flatwoods: To control susceptible broadleaf weeds and woody species such as gallberry and wax-myrtle, and for partial control of saw-palmetto, apply 2 to 4 quarts per acre of Garlon 4. To broaden the spectrum of species controlled to include fetterbush, staggerbush, titi, and grasses, apply 2 to 3 quarts per acre of Garlon 4 in tank mix combination with labeled rates of Arsenal Applicator's Concentrate herbicide. Where control of gallberry, wax-myrtle,

broadleaf weeds, and grasses is desired, 2 to 3 quarts per acre of Garlon 4 may be applied in tank mix combination with labeled rates of Accord herbicide.

These treatments may be broadcast during site preparation of flat planted or bedded sites or, on bedded sites, applied in bands over the top of beds. For best results, make applications in late summer or fall. Efficacy may not be satisfactory when applications are made in early season prior to August.

Note: Do not apply after planting pines.

Applications for Conifer Release

Note: Applications for conifer release may cause temporary damage and growth suppression where contact with conifers occurs; however, injured conifers should recover and grow normally. Over-the-top spray applications can kill pines.

Directed Sprays

To release conifers from competing hardwoods and brush such as red maple, sugar maple, striped maple, sweetgum, red and white oaks, ash, hickory, alder, birch, aspen, pin cherry, *Ceanothus* spp., blackberry, chinquapin, and poison oak, mix 4 to 20 quarts of Garlon 4 in enough water to make 100 gallons of spray mixture. This spray should be directed onto foliage of competitive hardwoods using knapsack or backpack sprayers with flat fan nozzles or equivalent any time after the hardwoods and brush have reached full leaf size, but before autumn coloration. The majority of treated hardwoods and brush should be less than 6 feet in height to ensure adequate spray coverage. Care should be taken to direct spray solutions away from conifer foliage, particularly foliage of desirable pines. See Table 1 for relationship between mixing rate, spray volume and maximum application rate.

Broadcast Applications for Mid-Rotation Understory Brush Control In Southern Coastal Flatwoods Pine Stands (Ground Equipment Only)

For control of susceptible species such as gallberry and wax-myrtle and broadleaf weeds, apply 2 to 4 quarts per acre of Garlon 4. To broaden the spectrum of woody plants controlled to include fetterbush, staggerbush, and titi, apply 2 to 3 quarts per acre of Garlon 4 in tank mix combination with labeled rates of Arsenal Applicator's Concentrate. Saw-palmetto will be partially controlled by use of Garlon 4 at 4 quarts per acre or by mixtures of Garlon 4 at 2 to 3 quarts per acre in tank mix combination with either Arsenal Applicator's Concentrate or Escort herbicide.

These mixtures should be broadcast applied over target understory brush species, but to prevent injury to pines, make applications underneath the foliage of pines. It is recommended that sprays be applied in 30 or more gallons per acre of total volume. For best results, make applications in late summer or fall. Efficacy may not be satisfactory when applications are made in early season prior to August.

Broadcast Applications for Conifer Release in the Pacific Northwest and California

On Dormant Conifers Before Bud Swell (Excluding Pines): To control or suppress deciduous hardwoods such as vine maple, bigleaf maple, alder, scotch broom, or willow before leaf-out or evergreen hardwoods such as madrone, chinquapin, and *Ceanothus* spp., use Garlon 4 at 1 to 2 quarts per acre. Diluents used may be diesel or fuel oil. Or, water plus 1 to 2 gallons per acre of diesel oil or a suitable surfactant or oil substitute at manufacturer's recommended rates may be used.

On Conifer Plantations (Excluding Pines) After Hardwoods Begin Growth and Before Conifer Bud Break ("Early Follar" Hardwood Stage): Use Garlon 4 at 1.0 to 1.5 quarts alone or plus 2,4-D low volatile ester herbicide in water carrier to provide no more than 3 pounds acid

equivalent per acre from both products. After conifer bud break, these sprays may cause more serious injury to the crop trees. Use of a surfactant may cause unacceptable injury to conifers especially after bud break.

On Conifer Plantations (Excluding Pines) After Conifers Harden Off In Late Summer and While Hardwoods Are Still Growing Actively: Use Garlon 4 at rates of 1.0 to 1.5 quarts per acre alone or plus 2,4-D low volatile ester to provide no more than 3 pounds acid equivalent per acre from both products. Treat as soon after conifer bud hardening as possible so that hardwoods and brush are actively growing. Use of oil, oil substitute, or surfactant may cause unacceptable injury to the conifers.

Broadcast Applications for Conifer Release in the Eastern United States

To release spruce, fir, red pine, and white pine from competing hardwoods such as red maple, sugar maple, striped maple, alder, birch (white, yellow, and grey), aspen, ash, pin cherry, and *Rubus* spp. and perennial and annual broadleaf weeds, use Garlon 4 at rates of 1.5 to 3.0 quarts per acre alone or plus 2,4-D amine or low volatile ester to provide no more than 4 pounds acid equivalent per acre from both products. Applications should be made in late summer or early fall after conifers have formed their overwintering buds and hardwoods are in full leaf and prior to autumn coloration.

Broadcast Applications for Conifer Release in the Lake States Region

To release spruce, fir, and red pine from competing hardwoods such as aspen, birch, maple, cherry, willow, oak, hazel, and *Rubus* spp. and perennial and annual broadleaf weeds, use Garlon 4 at rates of 1.5 to 3.0 quarts per acre. Applications should be made in late summer or early fall after conifers have formed their overwintering buds and hardwoods are in full leaf and prior to autumn coloration.

Warranty Disclaimer

Dow AgroSciences warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. Dow AgroSciences MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

Inherent Risks of Use

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable temperature, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of Dow AgroSciences or the seller. All such risks shall be assumed by buyer.

Limitation of Remedies

The exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories), shall be limited to, at Dow AgroSciences' election, one of the following:

1. Refund of purchase price paid by buyer or user for product bought, or
2. Replacement of amount of product used

Dow AgroSciences shall not be liable for losses or damages resulting from handling or use of this product unless Dow AgroSciences is promptly notified of such loss or damage in writing. In no case shall Dow AgroSciences be liable for consequential or incidental damages or losses.

The terms of the "Warranty Disclaimer" above and this "Limitation of Remedies" cannot be varied by any written or verbal statements or agreements. No employee or sales agent of Dow AgroSciences or the seller is authorized to vary or exceed the terms of the "Warranty Disclaimer" or this "Limitation of Remedies" in any manner.

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Label Code: D02-102-023
Replaces Label: D02-102-022

EPA-Accepted 07/22/97

Revisions:
Minor corrections to EPA accepted text dated 7-22-97



FOR WEED CONTROL, NATIVE GRASS ESTABLISHMENT AND TURF GROWTH
SUPPRESSION ON PASTURES, RANGELAND AND NONCROP AREAS

ACTIVE INGREDIENT:

Ammonium salt of imazapic (\pm)-2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-5-methyl-3-pyridinecarboxylic acid* 23.6%

INERT INGREDIENTS 76.4%

TOTAL 100.0%

*Equivalent to 22.2% (\pm)-2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-5-methyl-3-pyridinecarboxylic acid
(1 gallon contains 2.0 pounds of active ingredient as the free acid)

U.S. Patent No. 4,798,619
EPA Reg. No. 241-365

**KEEP OUT OF REACH OF
CHILDREN**

CAUTION!/PRECAUCION!

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

In case of an emergency endangering life or property involving this product, call day or night, 800-832-HELP.

See inside for Additional First Aid, Precautionary Statements, Directions for Use and Conditions of Sale and Warranty

BASF Corporation
26 Davis Drive
Research Triangle Park, NC 27709

BASF

FIRST AID

If inhaled	<ul style="list-style-type: none"> Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call a poison control center or doctor for further treatment advice.
If on skin or clothing	<ul style="list-style-type: none"> Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.
If in eyes	<ul style="list-style-type: none"> Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing. Call a poison control center for treatment advice.

HOTLINE NUMBER

Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact BASF Corporation for emergency medical treatment information: 1-800-832-HELP (4357).

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION!

Avoid breathing spray mist. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling.

Personal Protective Equipment (PPE):

Applicators and other handlers must wear:

- Long-sleeve shirt and long pants
- Chemical-resistant gloves made of waterproof material
- shoes plus socks

Follow manufacturer's instructions for cleaning and maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

User Safety Recommendations:

Users Should:

- Wash hands before eating, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

ENVIRONMENTAL HAZARDS

For terrestrial use only. DO NOT apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark.

DO NOT contaminate water when disposing of equipment washwaters or rinsate.

This chemical demonstrates the properties and characteristics associated with chemicals detected in ground water. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in ground-water contamination.

This product may contaminate water through drift of spray in wind. This product has a high potential for runoff for several months or more after application. Poorly draining soils and soils with shallow watertables are more prone to produce runoff that contains this product. A level, well maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential for contamination of water from rainfall-runoff. Runoff of this product will be reduced by avoiding applications when rainfall is forecasted to occur within 48 hours.

IMPORTANT

PLATEAU® herbicide may be applied to non-irrigation ditches and low lying areas when water has drained, but may be isolated in pockets due to uneven or unlevel conditions. DO NOT treat the inside of irrigation ditches. DO NOT rinse equipment on or near desirable trees or ornamental plants, or on areas where their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots. DO NOT use on residential lawns.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

This labeling must be in the possession of the user at the time of pesticide application.

DO NOT use **PLATEAU** on food or feed crops except as recommended by this label or supplemental labeling.

DO NOT cut treated area for hay within seven days after treatment.

DO NOT use organophosphate insecticides on newly seeded areas treated with **PLATEAU** unless severe injury or loss of stand can be tolerated.

Observe all cautions and limitations on this label and on the labels of products used in combination with **PLATEAU**. Do not use **PLATEAU** other than in accordance with the instructions set forth on this label. The use of **PLATEAU** not consistent with this label may result in injury to desired vegetation. Keep containers closed to avoid spills and contamination.

When making new plantings of prairiegrass or wildflowers, carry-over from persistent herbicides such as sulfonyl-urea, imidazolinone, triazine, substituted urea, dinitroaniline, and other herbicides applied the previous year may result in compounded injury or death of desirable vegetation when treated with **PLATEAU**.

When making applications around desirable trees or ornamental plants, small areas should be tested to determine the tolerance of a particular species to soil and/or foliar applications of **PLATEAU**. See "TOLERANCE OF TREES AND BRUSH TO **PLATEAU** HERBICIDE" section of this label.

DO NOT apply this product through any type of irrigation system.

DO NOT exceed 12 ounces of **PLATEAU** per acre in one year.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

- coveralls
- chemical-resistant gloves made of any waterproof material
- shoes plus socks

NON-AGRICULTURAL USE REQUIREMENTS

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard (WPS) for agricultural pesticides (40 CFR Part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries, or greenhouses.

Noncrop weed control is not within the scope of the Worker Protection Standard. See the GENERAL INFORMATION section of this label for a description of noncrop sites.

Do not enter treated areas without protective clothing until sprays have dried.

STORAGE AND DISPOSAL

DO NOT contaminate water, food or feed by storage or disposal.

PESTICIDE STORAGE: KEEP FROM FREEZING. DO NOT store below 20°F.

PESTICIDE DISPOSAL: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

CONTAINER DISPOSAL: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, by incineration or, if allowed by State and local authorities by burning. If burned, stay out of smoke.

DISCLAIMER

The label instructions for the use of this product reflect the opinion of experts based on research and field use. The directions are believed to be reliable and should be followed carefully. However, it is impossible to eliminate all risks inherently associated with use of this product. Turf injury, ineffectiveness or other unintended consequences may result because of such factors as weather conditions, presence of other materials, or the use of, or application of the product contrary to label instructions, all of which are beyond the control of BASF Corporation (BASF). All such risks shall be assumed by the user.

BASF shall not be responsible for losses or damages resulting from use of this product in any manner not set forth on this label. User assumes all risks associated with the use of this product in any manner not specifically set forth on this label.

BASF warrants only that the material contained herein conforms to the chemical description on the label and is reasonably fit for the use therein described when used in accordance with the directions for use, subject to the risks referred to above. BASF DOES NOT MAKE OR AUTHORIZE ANY AGENT OR REPRESENTATIVE TO MAKE ANY OTHER WARRANTIES, EXPRESS OR IMPLIED AND EXPRESSLY EXCLUDES AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

BUYER'S EXCLUSIVE REMEDY AND BASF'S EXCLUSIVE LIABILITY, WHETHER IN CONTRACT, TORT, NEGLIGENCE, STRICT LIABILITY OR OTHERWISE, SHALL BE LIMITED TO REPAYMENT OF THE PURCHASE PRICE OF **PLATEAU® herbicide**. In no case shall BASF or the seller be liable for consequential, special or indirect damages resulting from the use or handling of this product.

BASF makes no other express or implied warranty, including other express or implied warranty of FITNESS or of MERCHANTABILITY. User assumes the risk of any use contrary to label instructions, or under abnormal conditions, or under conditions not reasonably foreseeable by BASF.

USES WITH OTHER PRODUCTS (TANK-MIXES)

If this product is used in combination with any other product except as specifically recommended in writing by BASF Corporation then BASF Corporation shall have no liability for any loss, damage, or injury arising out of its use in any such combination not so specifically recommended. If used in combination recommended by BASF Corporation, the liability of BASF Corporation shall in no manner extend to any damage, loss or injury not directly caused by the inclusion of the BASF Corporation product in such combination use, and in any event shall be limited to return of the amount of the purchase price of the BASF Corporation product.

GENERAL INFORMATION

PLATEAU is an aqueous solution to be mixed with water and an adjuvant and applied as a spray solution to provide weed control and/or turf height suppression on pastures, rangeland (see "GUIDELINES FOR RANGELAND USE" section), Federal Conservation Reserve Program (CRP) land and noncropland areas including noncropland areas that may be grazed or cut for hay. Examples of noncropland areas include, but are not limited to railroad, utility, pipeline and highway rights-of-way, railroad crossings, utility plant sites, petroleum tank farms, pumping installations, non-agricultural fence rows, storage areas, non-irrigation ditchbanks, prairie sites, airports, industrial turf, golf courses, recreational and non-residential turf and other similar areas. **PLATEAU** may be used for the release of bermudagrass, bahiagrass, smooth bromegrass, wheatgrass, "wildtype" common Kentucky bluegrass, native prairiegrass, wildflowers, crown vetch, other grasses and certain legumes. **PLATEAU** can also be used for weed control during the establishment of native prairiegrasses and other grasses (see "REVEGETATION WITH PRAIRIEGRASSES AND OTHER FORAGE GRASSES" section).

PLATEAU is readily absorbed through leaves, stems, and roots and is translocated rapidly throughout the plant, with accumulation in the meristematic regions. Treated plants stop growing soon after spray application. Chlorosis appears first in the newest leaves, and necrosis spreads from this point. In perennials, the herbicide is translocated into, and kills, underground storage organs which prevents regrowth. Chlorosis and tissue necrosis may not be apparent in some plant species for several weeks after application. Complete kill of plants may not occur for several weeks after application. Adequate soil moisture is important for optimum **PLATEAU** activity. When adequate soil moisture is present, **PLATEAU** will provide residual control of susceptible germinating weeds. Activity on established weeds will depend on the weed species and rooting depth. **PLATEAU** is rainfast one hour after application.

PLATEAU will control annual and perennial grasses and broadleaf weeds and vine species. **PLATEAU** will provide residual control of labeled weeds which germinate in the treated area. Certain brush species and ornamentals may be injured by direct application of **PLATEAU** to their foliage. This product may be applied either preemergence or postemergence to the weeds. However, postemergence application is the method of choice in most situations, particularly for perennial species. For maximum activity, weeds should be growing vigorously at the time of postemergence applications and the spray solution should include an adjuvant (see "SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS" section). These solutions may be applied as a broadcast or as a spot treatment using backpack, or ground equipment.

PLATEAU may be applied in the dormant or growing season for weed control.

Tolerance of desirable grass species to **PLATEAU® herbicide** may be reduced when grasses are stressed due to insect damage.

disease, environmental conditions, shade, poorly drained soils or other causes.

Depending on the turf type being treated, some yellowing of turf may occur with applications during the growing season. Depending on weather conditions, yellowing will usually disappear in 2 to 4 weeks.

PLATEAU®herbicide should not be applied to newly seeded or sprigged grass stands, unless otherwise stated in this label (see "REVEGETATION WITH PRAIRIEGRASSES AND OTHER FORAGE GRASSES" section).

MANAGING OFF-TARGET MOVEMENT

Spray Drift: Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment-and-weather-related factors determine the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions.

Spray drift from applying this product may result in damage to sensitive plants adjacent to the treatment area. Only apply this product when the potential for drift to these and other adjacent sensitive areas (e.g. residential areas, bodies of water, known habitat for threatened or endangered species, or non-target crops) is minimal. Do not apply when the following conditions exist that increase the likelihood of spray drift from intended targets: high or gusty winds, high temperatures, low humidity, temperature inversions.

To minimize spray drift, the applicator should be familiar with and take into account the following drift reduction advisory information. Additional information may be available from state enforcement agencies or the Cooperative Extension on the application of this product.

The best drift management strategy and most effective way to reduce drift potential are to apply large droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential, but will not prevent drift if applications are made improperly, or under unfavorable environmental conditions (see **Wind, Temperature and Humidity and Temperature Inversions**).

Controlling Droplet Size:

- Volume - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.
- Pressure - Do not exceed the nozzle manufacturer's recommended pressures. For many nozzle types, lower pressure produces larger droplets. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.
- Number of Nozzles - Use the minimum number of nozzles that provide uniform coverage.
- Nozzle Orientation - Orienting nozzles so that the spray is released parallel to the airstream produces larger droplets than other orientations and is recommended practice. Significant deflection from the horizontal will reduce droplet size and increase drift potential.
- Nozzle Type - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid stream nozzles oriented straight back produce the largest droplets and the lowest drift. Do not use nozzles producing a mist droplet spray.

Application Height: Making applications at the lowest possible height (aircraft, ground driven spray boom) that is safe and practical reduces exposure of droplets to evaporation and wind.

Swath Adjustment: When applications are made with a crosswind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by adjusting the path of the application equipment (e.g. aircraft, ground) upwind. Swath adjustment distance should increase with increasing drift potential (higher wind, smaller droplets, etc.).

Wind: Drift potential is lowest between wind speeds of 3-10 mph. However, many factors, including droplet size and equipment type, determine drift potential at any given speed. Application should be avoided below 3 mph due to variable wind direction and high

inversion potential. NOTE: Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect spray drift.

Temperature and Humidity: When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.

Temperature Inversions: Drift potential is high during a temperature inversion. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud, which can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

Wind Erosion: Avoid treating powdery dry or light sandy soils when conditions are favorable for wind erosion. Under these conditions, the soil surface should first be settled by rainfall or irrigation.

Aerial Application Methods and Equipment: Use 2 or more gallons of water per acre. The actual minimum spray volume per acre is determined by the spray equipment used. Use adequate spray volume to provide accurate and uniform distribution of spray particles over the treated area and to avoid spray drift.

Managing spray drift from aerial applications: Applicators must follow these requirements to avoid off-target drift movement: 1) boom length - the distance of the outermost nozzles on the boom must not exceed $\frac{3}{4}$ the length of the wingspan or rotor, 2) nozzle orientation - nozzles must always point backward parallel with the air stream and never be pointed downwards more than 45 degrees, and 3) application height - without compromising aircraft safety, applications should made at a height of 10 feet or less above the crop canopy or tallest plants. Applicators must follow the most restrictive use cautions to avoid drift hazards, including those found in this labeling as well as applicable state and local regulations and ordinances.

Ground Application (Broadcast): Use 5 or more gallons of water per acre. The actual minimum spray volume per acre is determined by the spray equipment used. Use adequate spray volume to provide accurate and uniform distribution of spray particles over the treated area and to avoid spray drift.

MIXING INSTRUCTIONS

Fill the spray tank one-half to three-quarters full with clean water. Use a calibrated measuring device to measure the required amount of **PLATEAU**. Add **PLATEAU** to the spray tank while agitating. Fill the remainder of the tank with water.

For postemergence applications, add a surfactant to the spray tank (see "SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS" section of this label for specific recommendations). Maintain agitation while spraying to ensure a uniform spray mixture. An antifoaming agent may be added to the tank if needed.

When tank-mixing **PLATEAU** with recommended herbicides, add wettable powders, dispersible granules or other dry formulations first, then EC's, then **PLATEAU**, and then an adjuvant.

SPRAYING INSTRUCTIONS

DO NOT apply during windy or gusty conditions unless applications are being made with a drift control agent and/or an enclosed or shielded spray system. DO NOT apply if rainfall is threatening. Rainfall within 1 hour after **PLATEAU** application may reduce weed control.

GROUND APPLICATIONS:

Uniformly apply with properly calibrated ground equipment in 2 or more gallons of water per acre. Application equipment, specially designed to make low volume application should be used when making applications using less than 10 gallons of water per acre. A spray pressure of 20 to 40 psi is recommended.

To achieve acceptable control of the target vegetation, good spray coverage of the weed foliage (postemergence) or soil surface

(preemergence) is required. To achieve good spray coverage the sprayer must be calibrated to deliver the recommended spray volume and pressure and adjust the spray boom height to ensure proper coverage of weed foliage or soil surface (according to the manufacturer's recommendation). Avoid overlaps when spraying.

SPOT TREATMENTS:

To prepare the spray solution, thoroughly mix in water 0.25 to 1.5% (0.3 to 1.9 oz/gallon water) **PLATEAU® herbicide** plus an adjuvant (see "SPRAY ADJUVANTS FOR POSTEMERGENCE

APPLICATIONS" section). A methylated seed oil at 1% v/v is the recommended spray adjuvant except when treating seedling prairiegrasses and wildflowers. When making spot applications, spray coverage should be sufficient to moisten the leaves of the target vegetation, but not to the point of run-off. See section on desired species and do not exceed the recommended **PLATEAU** rate per acre. Also see "WEEDS CONTROLLED" and "SPECIAL WEED CONTROL" sections for specific rate and/or tank-mix recommendations.

AERIAL APPLICATION:

All precautions should be taken to minimize or eliminate spray drift. Fixed wing aircraft and helicopters can be used to apply **PLATEAU**, however, when making applications by fixed wing aircraft maintain appropriate buffer zones to prevent spray drift out of the target area. Aerial equipment designed to minimize spray drift such as a helicopter equipped with a MICROFOIL™ boom, or THRU-VALVE™ boom or raindrop nozzles, must be used and calibrated. Except when applying with a MICROFOIL boom, a drift control agent may be added at the recommended label rate. To avoid drift, applications should not be made during inversion conditions, when winds are gusty, or under any other conditions that promote spray drift.

Uniformly apply recommended amount of **PLATEAU**, using enough water volume to provide adequate coverage of target area or foliage. Include an adjuvant in the spray solution (see "SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS" section). A foam reducing agent may be added at the recommended rate, if needed. Aerial application to target species growing under the canopy of trees and brush may not receive sufficient spray coverage for effective control. For weed species with a recommended fall application timing (see "SPECIAL WEED CONTROL" section), delaying the aerial application until trees and brush have dropped their leaves can improve weed control and reduce the potential for tree and brush injury (see "TOLERANCE OF TREES AND BRUSH TO **PLATEAU** HERBICIDE" section).

IMPORTANT: Thoroughly clean application equipment, including landing gear, immediately after use of this product. Prolonged exposure of this product to uncoated steel (except stainless steel) surfaces may result in corrosion and failure of the exposed part. The maintenance of an organic coating (paint) may prevent corrosion.

Avoid overlaps when spraying.

SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS

Postemergence applications of **PLATEAU** require a spray adjuvant. See "SPECIAL WEED CONTROL" section. Due to variations in surfactant contents, certain surfactants containing high amounts of alcohols, paraffin based petroleum oils, and other compounds which can increase phytotoxicity to desirable vegetation, it is recommended to choose a low phytotoxic surfactant.

Methylated Seed Oils or Vegetable Oil Concentrates: Instead of a surfactant, a methylated vegetable-based seed oil concentrate containing 5 to 20% surfactant and the remainder methylated vegetable oil is the preferred adjuvant for use with **PLATEAU** herbicide and may be used at the rate of 1.5 to 2 pints per acre. Methylated seed oils provide their greatest effects at 30 GPA or less. At spray volumes above 50 GPA, their advantage appears negated. When using spray volumes greater than 30 gallons per acre methylated seed oil or vegetable based seed oil concentrates should be mixed at a rate of 1% of the total spray volume or alternatively use a nonionic surfactant as described below. Research indicates these oils may aid in deposition and uptake of **PLATEAU** for hard-to-control perennials, waxy leaf species or when plants are under moisture or temperature stress. **DO NOT** use a methylated seed oil or vegetable oil concentrate when making applications to newly emerged seedling prairiegrasses or wildflowers as injury may occur.

Nonionic Surfactants: Use a nonionic surfactant at the rate of 0.25% v/v or higher (see manufacturer's label) of the spray solution (0.25% v/v is equivalent to 1 quart in 100 gallons). For best results, select a nonionic surfactant with a HLB (hydrophilic to lipophilic balance) ratio between 12 and 17 and having at least 60% surfactant in the formulated product (alcohols, fatty acids, oils, ethylene glycol or diethylene glycol should not be considered as surfactants to meet the above requirements). Nonionic surfactants are the preferred adjuvant for use with **PLATEAU** herbicide in bermudagrass pastures and hay meadows.

Silicone-Based Surfactants: See manufacturer's label for specific rate recommendations. Silicone-based surfactants may reduce the surface tension of the spray droplet allowing greater spreading on the leaf surface as compared to conventional nonionic surfactants. However, some silicone-based surfactants may dry too quickly, limiting herbicide uptake and higher spray volumes may exhibit "run-off".

Fertilizer/Surfactant Blends: Nitrogen-based liquid fertilizers such as 28%N, 32%N, 10-34-0, or ammonium sulfate, may be added at the rate of 2 to 3 pints per acre in combination with the recommended rate of nonionic surfactant or methylated seed oil. Research indicates that nitrogen based fertilizers aid in the burndown of annual weeds and increase **PLATEAU** uptake through waxy leaf species. However, fertilizers may increase phytotoxicity to desired species and newly emerged seedling prairiegrasses and wildflowers. The use of liquid fertilizers at a rate of 2 to 3 pints per acre in a tank-mix without a nonionic surfactant or a methylated seed oil is not recommended and may result in herbicide failure. Only when liquid fertilizer is used as the spray carrier is no additional spray adjuvant required.

TANK MIXES

For use in noncrop areas, **PLATEAU** may be tank-mixed with PENDULUM® herbicide for additional control of late season annual grasses and certain broadleaves. For additional weed control in noncrop areas, **PLATEAU** may be tank-mixed with ACCORD®, ROUNDUP® PRO, glyphosate, ARSENAL® herbicide, SAHARA® DG herbicide, diuron, CAMPAIGN®, FINALE®, GARLON™ 3A, MSMA, VANQUISH®, OUST®, ESCORT®, TORDON®, or other labeled products. A compatibility test is advised for products not listed. 2,4-D and other phenoxy type herbicides have resulted in reduced control of perennial grass weeds.

For tank mix recommendations for use in bermudagrass pastures, refer to the "DIRECTIONS FOR USE IN BERMUDAGRASS PASTURES AND HAY MEADOWS" section.

DO NOT tank mix with organophosphate insecticides or use the same year as **PLATEAU** when making applications to newly planted areas.

Consult manufacturer's labels for specific rates and weeds controlled. Always follow the more restrictive label when making an application involving tank-mixes.

FOR WEED CONTROL IN PASTURE AND RANGELAND

For the control of undesirable weeds in pasture and rangeland (see "GUIDELINES FOR RANGELAND USE" section), apply **PLATEAU** at 2 to 12 oz. per acre as a broadcast treatment or as a 0.25% to 1% solution with 1.0% MSO for spot treatments. See appropriate sections of this label for specific use directions.

GUIDELINES FOR RANGELAND USE

PLATEAU may be applied to rangeland for the control of undesirable vegetation in order to achieve one or more of the following vegetation management objectives:

1. The control of undesirable (non-native, invasive and noxious) plant species.
2. The control of undesirable vegetation in order to aid in the establishment of desirable rangeland plant species.
3. The control of undesirable vegetation in order to aid in the establishment of desirable rangeland vegetation following a fire.
4. The control of undesirable vegetation for purposes of wildfire fuel reduction.
5. The release of existing desirable rangeland plant communities from the competitive pressure of undesirable plant species.

6. The control of undesirable vegetation for purposes of wildlife habitat improvement.

To ensure the protection of threatened and endangered plants when applying **PLATEAU® herbicide** to rangeland:

1. Federal agencies must follow NEPA regulations to ensure protection of threatened and endangered plants.
2. State agencies must work with the Fish and Wildlife Service or the Service's designated state conservation agency to ensure protection of threatened and endangered plants.
3. Other organizations or individuals must operate under a Habitat Conservation Plan if threatened or endangered plants are known to be present on the land to be treated.

Please see the appropriate section(s) of this label for specific use directions for the desired rangeland vegetation management objective.

PLATEAU should only be applied to a given rangeland acre as specific weed problems arise. For the control of annual weed species such as cheatgrass, downy brome and medusahead rye, a single application of **PLATEAU** that coincides with the successful establishment and/or release of desirable rangeland vegetation and the use of available IPM can provide effective, sustainable control of the annual weed problem. For difficult to control perennial weed species such as leafy spurge, dalmatian toadflax and Russian knapweed, a single broadcast application of **PLATEAU** should be effective in most cases. If needed, spot treatments with **PLATEAU** can be used to control any remnant plants or new seedlings that may emerge. Long term control of undesirable weed species ultimately depends on the successful use of land management practices that promote the growth and sustainability of desirable rangeland plant species.

DIRECTIONS FOR USE IN BERMUDAGRASS PASTURES AND HAY MEADOWS

PLATEAU may be used postemergence at a rate of 4 to 12 oz per acre for control of undesirable winter and summer annual and perennial grasses in bermudagrass pastures and hay meadows (see rate and timing recommendations below). **PLATEAU** may be used on common and coastal varieties of bermudagrass including, but not restricted to Tifton 44, 78 and 85, Alicia and Russell. Suppression of bermudagrass growth for 30 to 45 days or longer may occur, depending upon growth conditions after application. Jiggs bermudagrass in particular has shown greater sensitivity to **PLATEAU**. Do not use **PLATEAU** if this growth response is not acceptable.

In bermudagrass pastures and hay meadows, even and thorough spray coverage is necessary to achieve the desired level of weed control. To ensure proper spray coverage, the sprayer must be calibrated to deliver the recommended spray volume and pressure and the spray boom height adjusted to ensure proper coverage of weed foliage (according to the manufacturer's recommendation). The use of boomless or flood type nozzles is not recommended and may result in decreased weed control.

DO NOT apply **PLATEAU** to drought stressed bermudagrass.

DO NOT use **PLATEAU** for the establishment of sprigged or seeded bermudagrass.

DO NOT use **PLATEAU** on World Feeder varieties of bermudagrass.

DO NOT apply **PLATEAU** during transition from dormancy to full green-up.

AVOID applications of **PLATEAU** to newly aerated fields for 30 days after aeration.

Spring Applications and Bermudagrass Tolerance: Spring application of **PLATEAU** should only be made after bermudagrass has reached 100% green-up. **PLATEAU** applications to bermudagrass during transition from winter dormancy to 100% green-up will significantly delay green-up and growth of bermudagrass, resulting in the potential loss of one or more cuttings. Bermudagrass can be considered to have reached 100% green-up only when all stolons (runners) have developed new active growth. Partial green-up may be characterized by the green appearance of new bermudagrass growth in the field, but upon close inspection some of the stolons may not have begun to grow. **PLATEAU** applications made at this time can still cause significant reductions in bermudagrass growth and development and should be delayed until 100% green-up. To minimize bermudagrass response from spring

applications, all applications should be made postemergence to the targeted summer annual or perennial weeds. See specific use directions below for appropriate postemergence timing for targeted weed species.

General rate recommendations: Most annual and some perennial weeds in bermudagrass pastures and hay meadows can be controlled with postemergent application of **PLATEAU** herbicide at 4 to 6 oz per acre. For early applications when target weeds are small and have not been subjected to multiple cuttings, the lower recommended rate should be used. For later applications as target weeds become older, larger or have been subjected to multiple cuttings, then the higher recommended rate should be used. Read and follow the specific rate recommendations below for the individual weed species.

Postemergent Control of Summer Annual and Perennial Grass Weeds: Apply **PLATEAU** after bermudagrass has reached full green-up and target grass weeds are at the desired growth stage (see recommended rates and growth stages below). Early Spring applications made during transition from dormancy to green-up will delay bermudagrass green-up and subsequent bermudagrass growth. Recommended **PLATEAU** applications may cause some stolon internode shortening and yellowing of the bermudagrass. The use of a nitrogen fertilizer (32-0-0 or 28-0-0) as the spray carrier will shorten recovery time.

For summer annual grass control apply 4 to 6 oz per acre of **PLATEAU** early postemergence (2 to 4 leaf stage) following full bermudagrass green-up. If target weeds are at or above boot stage, apply 6 to 8 oz per acre for control. Always add a surfactant when applying **PLATEAU** unless liquid fertilizer is being used as the spray carrier. **PLATEAU** will provide some preemergence annual grass control, however initial applications need to be made postemergence to target weed species.

For summer perennial grass control apply 6 to 12 oz per acre of **PLATEAU** postemergence following bermudagrass green-up. If higher rates (8 to 12 oz per acre) are needed for control of target species, **PLATEAU** can be applied in the fall before killing frost occurs. When making a fall application, if bermudagrass has been cut for hay, allow sufficient regrowth of target species before making application. Always add a surfactant when applying **PLATEAU** unless liquid fertilizer is being used as the spray carrier.

Postemergent Control of Winter Annual and Perennial Grass Weeds: Apply **PLATEAU** herbicide when bermudagrass is dormant prior to green-up. If bermudagrass has green tissue at the root crown or stolons, applications of **PLATEAU** may delay green-up of bermudagrass and subsequent bermudagrass growth. During mild winters, bermudagrass in the deep South may not be completely dormant. Applications in these areas should be avoided if delayed green-up cannot be tolerated.

For winter annual and perennial grass control, apply 6 to 12 oz per acre of **PLATEAU** postemergent, when bermudagrass is dormant. The addition of 16 to 24 oz per acre of **ROUNDUP® ULTRA** or glyphosate equivalent will increase control of larger winter annual and cool season perennial grasses. Always add a surfactant when applying **PLATEAU** herbicide unless liquid fertilizer is being used as the spray carrier.

Recommended PLATEAU Herbicide Rates for Postemergent Summer Annual Grass Control

Common Name	Genus Species	Weed Height (inches)	Rate per Acre (Fluid oz)
Large Crabgrass	<i>Digitaria sanguinalis</i>	≤4	4
		>4	6
Southern Crabgrass	<i>Digitaria ciliaris</i>	≤4	4
		>4	6
Smooth Crabgrass	<i>Digitaria ischaemum</i>	≤4	4
		>4	6
Giant Foxtail	<i>Setaria faberii</i>		6
Green Foxtail	<i>Setaria viridis</i>	≤4	4
		>4	6

Recommended PLATEAU® Herbicide Rates for Postemergent Summer Annual Grass Control (CONT:)

Common Name	Genus Species	Weed Height (inches)	Rate per Acre (fluid oz)
Yellow Foxtail	<i>Setaria glauca</i>	≤4	4
		>4	6
Texas Panicum	<i>Panicum texanum</i>		6
Fall Panicum	<i>Panicum dichotomiflorum</i>		6
Broadleaf Signalgrass	<i>Bracharia platyphylla</i>	≤4	4
		>4	6
Annual Jewgrass	<i>Microstegium vimineum</i>	≤4	4
		>4	6
Barnyardgrass	<i>Echinochloa crus-galli</i>	≤4	4
		>4	6
Sandbur	<i>Cenchrus spp.</i>	≤4	4
		>4	6

¹ Summer annual grasses that are older, larger or have been subjected to multiple cuttings should be treated with the higher rate.

Applications made to summer annual grasses should be done after bermudagrass green-up. Applications of **PLATEAU® herbicide** made during bermudagrass transition will delay green up and subsequent bermudagrass growth. Avoid applications to bermudagrass during green-up transition if delayed green-up cannot be tolerated.

Recommended PLATEAU Herbicide Rates for Postemergent Summer Perennial Grass Control

Common Name	Genus Species	Weed Height (inches) ¹	Rate per Acre (fluid oz)
Johnsongrass	<i>Sorghum halepense</i>	18-24	8
		>24	12
Vaseygrass	<i>Paspalum urvillei</i>	4-8	6-8
Nutsedge	<i>Cyperus spp.</i>	≤4	4
		>4	6
Bahiagrass	<i>Paspalum notatum</i>	4-8	6-8
Dallisgrass ²	<i>Paspalum dilatatum</i>	4-8	8-12
Smutgrass ²	<i>Sporobolus indicus</i>	4-8	8-12

¹ Summer annual grasses that are older, larger or have been subjected to multiple cuttings should be treated with the higher rate.

² Suppression

Recommended PLATEAU Herbicide Rates for Postemergent Winter Annual and Cool Season Perennial Grass Control

Common Name	Genus Species	Weed Height (inches) ¹	Rate per Acre (fluid oz)
Annual Ryegrass*	<i>Lolium multifloru</i>	≤6	6
		>6	10
Tall Fescue	<i>Festuca arundinacea</i>	-	12
Wild Oats	<i>Avena fatua</i>	≤6	6
		>6	10
Little Barley	<i>Hordeum pusillum</i>	≤6	4
		>6	6

*AHAS and ALS resistant annual ryegrass has been documented across the Southeastern United States. To minimize this problem, tank mix 16 to 24 oz per acre of ROUNDUP® ULTRA or glyphosate equivalent when making applications to annual ryegrass.

Spray Adjuvants: The addition of 10 to 20 gallons per acre of 32-0-0 or 28-0-0 liquid fertilizer as part of the spray carrier will promote the recovery of the bermudagrass from any growth reduction caused by the herbicide application. No additional spray adjuvant is required if liquid fertilizer is used as the spray carrier.

See "SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS" section for additional spray adjuvant recommendations.

DO NOT use crop oil concentrates (COC) as spray adjuvant for control of weeds with **PLATEAU**.

Tank Mixtures: For broadleaf weed control the addition of a broadleaf herbicide such as **WEEDMASTER®** is recommended. **PLATEAU** may also be tank mixed with **GRAZON®**, **REMEDY®**, **REDEEM®**, **ALLY®**, 2,4-D and **ROUNDUP® ULTRA** or glyphosate equivalent. Applications with tank mixes of 2,4-D that exceed 1 pound active ingredient per acre and applications with tank mixes of triclopyr amine that exceed 1.5 pounds active ingredient per acre may reduce efficacy on target grass weed species.

USE OF PLATEAU HERBICIDE ON FEDERAL CONSERVATION RESERVE PROGRAM (CRP) LAND

PLATEAU may be used on Federal Conservation Reserve Program (CRP) land at rates up to 12 oz. per acre per year (see minimum plant-back intervals below). See appropriate section of this label for specific instructions for the intended use.

ROTATIONAL CROP RESTRICTIONS

The following rotational crops may be planted after applying **PLATEAU**. Planting rotational crops earlier than the recommended interval may result in crop injury.

Plateau Use Rate (oz/A)	Minimum Plant Back Interval (Months After PLATEAU Herbicide Application)				
	≤4	12	12	18	26
5-8	12	14	22	30	44
9-12	12	18	24	36	48
Rotational Crops	Bahiagrass CLEARFIELD® corn hybrids	Snapbeans Southern peas	Barley Cotton ⁴ Grain sorghum	Field corn ² Cotton ⁴ All crops not otherwise list- ed or included	Canola ² Potatoes ³ Red table beets ²
	Peanuts	Soybeans	Tobacco	Oats	for use on this Sugar beets ²
	Rye				
	Wheat				

¹For Arizona, New Mexico, Oklahoma, and Texas only: Depending on the **PLATEAU** use rate, cotton may be planted 18 to 24 months after **PLATEAU** application in the states of Arizona, New Mexico, Oklahoma, and Texas unless drought conditions develop the year of **PLATEAU** application. DO NOT rotate to cotton at 18 to 24 months after **PLATEAU** application if less than 15 inches of rainfall or irrigation is received from the time of **PLATEAU** application through November 1 of the same year. If drought conditions develop the year of **PLATEAU** application, cotton may be planted 26, 30 and 40 months after **PLATEAU** application.

²After the recommended rotational interval listed for these selected crops and for all crops not otherwise listed or included for use on this label, a successful field bioassay must be completed. The field bioassay consists of a test strip of the intended rotational crop planted across the previously treated field and grown to maturity. The test strip should include low areas and knolls, and include variations in soil such as type and pH. If no crop injury is evident in the test strip, then the intended rotational crop may be planted the following year.

Use of **PLATEAU** in accordance with label directions is expected to result in normal growth of plant-back crops in most situations; however, various environmental and agronomic factors make it impossible to eliminate all risks associated with the use of this product and, therefore, plant-back crop injury is always possible. If crop injury is a concern then a bioassay with the desired crop is recommended prior to planting.

FOR FOLIAR AND SEEDHEAD SUPPRESSION OF BAHIAGRASS, COOL SEASON GRASSES AND SUPPRESSION OF SOME ANNUAL WEEDS

Bahiagrass: **PLATEAU** may be used at the rate of 2 to 6 oz per acre to suppress growth and seedhead development of bahiagrass in

unimproved areas. In North and South Carolina it is recommended to use **PLATEAU® herbicide** at the rate of 2 oz per acre as higher rates may cause turf thinning. Depending on rate of **PLATEAU** used, surfactant and environmental conditions, temporary turf discoloration may occur. For optimum performance, application should be made after green-up. Applications may be made before or after mowing. If applied prior to mowing, raise mowing height to leave adequate existing foliage as new growth will be suppressed. If applied after mowing, allow adequate foliage to remain by increasing mower height or allowing time for foliar regrowth prior to application. **DO NOT** apply to turf under stress (drought, cold, insect, disease, etc.) or severe injury may occur. **DO NOT** use a methylated seed oil adjuvant.

PLATEAU	PHYTOTOXICITY	LENGTH OF SUPPRESSION
2 oz	none to low	partial to season long
3 to 6 oz	low to moderate	season long

For winter annual weed control, apply 8 oz of **PLATEAU** when bahiagrass is dormant, but when weeds are actively growing. This can be followed by 3 to 4 oz of **PLATEAU** in the spring after bahiagrass green-up for the suppression of seedheads and foliage.

Cool Season Grasses:

KY31 Tall Fescue and "Wildtype Common" Kentucky Bluegrass: Apply **PLATEAU** at 2 to 4 oz per acre for foliar and seedhead suppression of certain cool season grasses such as "KY31" tall fescue and "wildtype common" Kentucky bluegrass. Do not use a methylated seed oil adjuvant. Add a surfactant to the 2 oz rate of **PLATEAU** for optimum performance. The addition of a surfactant to 4 oz of **PLATEAU** may cause excessive turf injury or mortality of tall fescue. Application to turf type tall fescue or Kentucky bluegrass may result in severe injury or loss of stand.

Wheatgrass: Apply **PLATEAU** at 6 to 10 oz. per acre for foliar and seedhead suppression of crested wheatgrass, and 6 to 12 oz. per acre for foliar and seedhead suppression of intermediate wheatgrass. Other wheatgrass species may also be suppressed, however, apply **PLATEAU** to a limited area to determine effectiveness. Tank-mixes with 2,4-D or products containing 2,4-D may decrease the effectiveness of **PLATEAU**. Tank-mixes with GARLON®, TORDON®, TRANSLINE™ and VANQUISH® may decrease the potential of turf injury. **DO NOT** apply to turf under stress or severe injury may occur.

FOR THE CONTROL OF UNDESIRABLE WEEDS IN BERMUDAGRASS NOT BEING GROWN FOR FORAGE OR HAY

PLATEAU may be used on bermudagrass turf such as roadsides, utility rights-of-way, railroad crossings, airports, non-irrigation drainage ditches and other noncropland sites. There is a differential tolerance between bermudagrass types (see below paragraphs). Depending on bermudagrass type, timing of application, and **PLATEAU** rate, some foliar, stolon, and seedhead suppression may occur. **IMPORTANT:** Apply **PLATEAU** after bermudagrass has reached full green-up. Spring applications made prior to full green-up may delay green-up. Always add a surfactant when applying **PLATEAU**. **DO NOT** apply to grass under stress from drought, disease, insects or other causes. Simultaneous mow/spray operations may suppress internode development. After mowing, allow adequate foliage regrowth prior to **PLATEAU** application as some internode suppression may prevent bermudagrass from quickly recovering from mowing.

Common Bermudagrass: Common bermudagrass is the most tolerant bermudagrass to **PLATEAU**. Tank-mixes with ROUNDUP PRO, ACCORD or glyphosate will improve the weed control spectrum, but may increase turf phytotoxicity. Some stolon internode shortening and seedhead suppression may occur for the first 8 weeks.

Established Coastal Bermudagrass: **PLATEAU** at 2 to 12 oz per acre will provide control of labeled weeds as well as foliar and seed head suppression of established coastal bermudagrass. Do not use on World Feeder varieties of bermudagrass. Depending on environmental conditions and weed pressure, the longevity of suppression and weed control increases as the **PLATEAU** rate increases. Tank-mixes with ROUNDUP PRO, ACCORD, or glyphosate may result in death or excessive injury of coastal bermudagrass.

Turf Type Bermudagrass: Turf type bermudagrass varieties show a high degree of variation in tolerance to **PLATEAU**. **PLATEAU** at rates of 2 to 6 oz per acre will provide some annual weed control and foliar & seedhead suppression. Rates above 6 oz per acre may result in excessive injury or death of turf type bermudagrass.

SEE ABOVE SECTIONS FOR PLATEAU HERBICIDE RATES AND TIMINGS FOR SPECIFIC BERMUDAGRASS TYPES WITH REGARD TO WEED CONTROL AND TURF TOLERANCE.

Winter Annual Weed Control: Apply **PLATEAU® herbicide** at the rate of 4 to 12 oz. per acre prior to winter weed germination or while winter weeds are actively growing. Early spring applications may delay green-up of bermudagrass turf.

Summer Annual Weeds: For best results, apply **PLATEAU** at the rate of 4 to 12 oz per acre preemergence or early postemergence before weeds have reached 6 inches in height. Larger weeds may be controlled depending on susceptibility, growing conditions, tank-mix partner and adjuvant selection.

Perennial Weeds: Apply **PLATEAU** at the rate of 8 to 12 oz per acre postemergence after weeds have produced adequate foliage for herbicide uptake. For a particular weed see "SPECIAL WEED CONTROL" section below. The addition of ACCORD or ROUNDUP PRO herbicide may increase control.

Bahiagrass Control: Apply **PLATEAU** at the rate of 8 to 12 oz per acre postemergence. See "SPECIAL WEED CONTROL" section below for recommendations. The addition of ROUNDUP PRO or ACCORD herbicide at 12 to 16 oz per acre may increase control.

FOR THE CONTROL OF UNDESIRABLE WEEDS IN UNIMPROVED CENTIPEDE GRASS

PLATEAU may be applied at a rate of 4 to 8 oz per acre to established centipede grass for the control of annual broadleaf and grass weeds. Apply **PLATEAU** after centipede grass has reached full green-up. Spring applications made prior to full green-up may delay green-up. Always add a surfactant when applying **PLATEAU**. **DO NOT** apply to grass under stress from drought, disease, insects or other causes. Simultaneous mow/spray operations may suppress internode development. After mowing, allow adequate foliage regrowth prior to **PLATEAU** application as some internode suppression may prevent centipede grass from quickly recovering from mowing.

FOR CONTROL OF UNDESIRABLE WEEDS IN SMOOTH BROMEGRASS, WILDTYPE COMMON KENTUCKY BLUEGRASS AND WHEATGRASSES

PLATEAU may be used on smooth bromegrass, "wildtype" common Kentucky bluegrass and wheatgrass. **PLATEAU** provides control of labeled grass and broadleaf weeds (see "WEEDS CONTROLLED" and "SPECIAL WEED CONTROL" sections). Treatment of smooth bromegrass and wheatgrass with **PLATEAU** may result in foliar height and seedhead suppression.

Smooth Bromegrass and "Wildtype" Common Kentucky Bluegrass: Use **PLATEAU** at 4 to 8 oz per acre in the spring for weed control and growth suppression after smooth bromegrass and "wildtype" common Kentucky bluegrass have reached 100% green-up. Applications prior to 100% green-up may delay green-up. Rates from 8 to 12 oz per acre may be applied in the spring but may result in excessive growth suppression. For fall applications (see "SPECIAL WEED CONTROL" section), **PLATEAU** may be used at 8 to 12 oz per acre for control of perennial weeds.

Wheatgrass: To control undesirable weeds in wheatgrasses apply **PLATEAU** at 4 to 12 oz. per acre.

FOR CONTROL OF UNDESIRABLE WEEDS IN CROWN VETCH

PLATEAU may be applied at the rate of 4 oz per acre to newly seeded crown vetch beds to aid in the establishment of vetch and reduce weed competition.

PLATEAU at 8 to 12 oz per acre may be used on unimproved established crown vetch in noncropland areas. **PLATEAU** provides control of labeled grass and broadleaf weeds (refer to the "WEEDS CONTROLLED" and "SPECIAL WEED CONTROL" sections for specific rates). Treatment of crown vetch beds with **PLATEAU** may

cause internode shortening and some minor tip chlorosis depending on timing of application.

PLATEAU® herbicide should be applied during winter dormancy or early spring to reduce potential injury. Applications made after May, may result in increased injury or defoliation. Addition of surfactants such as dilimene based or crop oil concentrates will increase injury. Fall applications during the period of active crown vetch growth may result in severe injury or loss of stand.

PLATEAU may be applied at the rate of 2 to 12 oz per acre to newly established or existing stands of labeled species (see below for details) in such areas as pasture, rangeland (see "GUIDELINES FOR RANGELAND USE" section), Conservation Reserve Program (CRP) land and noncropland sites such as roadsides, industrial sites, prairie restoration sites, drainage ditch banks, and other similar areas. Certain local ecotypes or varieties may be suppressed by **PLATEAU**. Many factors such as poor seedling vigor, cool temperatures, poor soil, planting depth, excessive moisture, disease, insects and dry weather after emergence can all result in poor stands. Additional stress of herbicide residue, poor soils and other factors contributing to poor seedling vigor can also increase injury and could result in mortality. BASF can not be held responsible for such unforeseen factors. It is suggested to try **PLATEAU** on a small area if tolerance is not known. **PLATEAU** controls many annual and perennial grass and broadleaf weeds. Weed competition is reduced allowing grass seedlings to establish. **PLATEAU** is also effective for control of noxious weeds in established grass stands and must be applied postemergence as a foliar treatment to perennial weeds. **IMPORTANT: ALWAYS ADD AN ADJUVANT** when applying **PLATEAU**. To maximize weed control always use a methylated seed oil when treating established grass stands. Use a nonionic surfactant when treating newly emerged seedling grasses. The addition of liquid fertilizer will decrease grass tolerance and should not be used when treating newly emerged seedling grasses.

PLATEAU may be applied at a rate of up to 12 oz per acre to Federal Conservation Reserve Program (CRP) land for the establishment or release of certain grass species (see "TOLERANT GRASS SPECIES" table).

Establishment: For optimum results in establishing mixed grass stands with **PLATEAU**, make application at planting before grass seedlings emerge. Newly emerged grasses can be sensitive to **PLATEAU** and/or the adjuvant used. If grasses have begun to emerge, it is best to wait until they have reached the five leaf stage to make a **PLATEAU** application and use a nonionic or silicone surfactant. Do not use a methylated seed oil at this time as some grass species tolerance will be lost. **PLATEAU** will control annual weeds preemergence or early postemergence. See "WEEDS CONTROLLED" section for maximum height of weeds and see below for more details on best rate and timing for grass and wildflower species. Postemergence applications may result in stand thinning due to variability in seedling grass tolerance to the use of spray adjuvants. Seedling grasses are generally more tolerant to the use of spray adjuvants after they have reached the five leaf stage. When planting into a field which was row cropped the previous year, compounded injury may occur from herbicide carry-over (see "DIRECTIONS FOR USE" section).

Rates and Control: Apply **PLATEAU** at 2 to 6 oz per acre to fields cropped the previous year, when annual weeds are the target and/or if grass/forb mixtures are used. **PLATEAU** at 2 to 6 oz per acre will provide control and/or suppression of many annual grass and broadleaf weeds. Use lower rates when in the northern most U.S., dry climates or for late season plantings into clean seedbeds. **PLATEAU** rates as low as 2 oz. per acre may be used on soils with a pH > 7, a low CEC and a coarse texture containing a minimum of clay and organic matter. Use higher rates in heavy weed pressure, heavy residue, high organic matter, high rainfall and long growing season (southern portions of Illinois, Indiana, Missouri and Ohio, etc.). Apply **PLATEAU** at 8 to 12 oz per acre for giant ragweed or for perennial weed control/suppression. **PLATEAU** rates of 8 to 12 oz per acre may result in stunting or stand thinning. The duration and intensity of suppression are directly related to weed pressure, chemical residue, soil type and environmental conditions. See below for details for particular grass tolerances and timings.

Established Stands: For optimum results, apply **PLATEAU** as an early postemergence application to annual grasses and broadleaf weeds. For perennial weed control, see "SPECIAL WEED CONTROL" section. The use of high rates may result in foliar and/or seed head height suppression of established grass stands. This effect is more

likely to occur under conditions of light soils, low weed pressure, low rainfall, and short growing seasons. Use the lower rates for light weed infestations or when applying to grass stands containing desirable wildflowers and legumes (see "WILDFLOWER ESTABLISHMENT AND MAINTENANCE" section for rate tolerance). Use higher rates to broaden and lengthen weed control spectrum.

Big Bluestem, Little Bluestem and Indiangrass: PLATEAU® herbicide may be applied at the rate of 2 to 12 oz per acre at planting, or any time thereafter, including after seedling grasses have emerged or to perennial stands (dormant or actively growing). See "WEEDS CONTROLLED" section for desired rate. Use the lower rates in Wisconsin, Michigan, Minnesota, South Dakota, North Dakota, Kansas, Oklahoma, Texas and Nebraska and higher rates as rainfall and/or growing season increases.

Switchgrass (*Panicum virgatum*): **PLATEAU** is not recommended for the establishment of pure switchgrass stands as severe injury or death may result. **PLATEAU** may be applied at a rate of 2 to 4 oz per acre if switchgrass is planted in mixed stands with tolerant species, but only if some stand thinning or loss of stand can be tolerated. Mature switchgrass planting can be reclaimed from certain perennial weeds such as tall fescue, leafy spurge, johnsongrass, etc., with **PLATEAU** at rates of 10 to 12 oz per acre. However, severe stunting and injury is imminent. DO NOT apply **PLATEAU** to switchgrass if such severe injury can not be tolerated.

Sideoats and Blue Grama: Apply **PLATEAU** to monoculture stands of sideoats and blue grama only if some stand thinning or loss of stand can be tolerated. **PLATEAU** may be applied at the rate of 2 to 4 oz/A plus an adjuvant to aid in the establishment of sideoats and blue grama after new seedlings have emerged and reached the five (5) leaf stage. When using **PLATEAU** at 4 oz per acre it is not recommended to use in combination with a methylated seed oil adjuvant as stand thinning may occur. The lower rates may provide adequate weed suppression in early summer plantings in the states of Wisconsin, Michigan, Minnesota, South Dakota, North Dakota, Kansas, Oklahoma, Texas and Nebraska and other states where growing degree days are short. Sideoats and blue grama have shown tolerance to **PLATEAU** at 2 to 4 oz/A, applied preemergence at planting, however, some stand thinning may occur. For weed control in established stands use 4 to 10 oz/A of **PLATEAU**. Up to 12 oz/A of **PLATEAU** may be applied, but may result in foliar and/or seedhead suppression, or in the injury of sideoats and blue grama, depending on surfactant choice, soil type, variety, weed pressure and environmental conditions.

Buffalograss: Apply **PLATEAU** at the rate of 2 to 4 oz/A for control or suppression of labeled weeds and to aid in the establishment of newly sprigged buffalograss. Apply **PLATEAU** immediately after planting prior to spring growth or seed germination. New growth and small seedlings can be severely injured or killed. If applying after emergence it is best to wait until buffalograss has at least five true leaves and use a nonionic or silicone surfactant. Do not use a methylated seed oil. For established stands, **PLATEAU** may be applied at the rate of 2 to 8 oz/A for weed control. Higher rates may cause some turf discoloration and stunting. **PLATEAU** may be applied to dormant buffalograss to control winter annual weeds. Turf type buffalograss may express different tolerance level to **PLATEAU** than wild type buffalograss. Some turf types can tolerate low rates of **PLATEAU** at seeding. Consult seed dealer for details.

Eastern Gamagrass: **PLATEAU** should only be used for the establishment or maintenance of eastern gamagrass if some stand thinning or loss can be tolerated. Apply **PLATEAU** at 2 to 6 oz per acre at planting prior to gamagrass emergence. Stand thinning and stunting is imminent. Adverse conditions, poor soils, or added stress to the gamagrass could result in stand mortality. Postemergence application to seedlings will cause mortality. On established eastern gamagrass, apply **PLATEAU** at 2 to 8 oz per acre prior to gamagrass breaking dormancy. Some stunting will occur and increases as the **PLATEAU** rate increases. Applications made during or after green-up may result in foliar and seedhead suppression and possible mortality of weak plants.

Tall Fescue Control: Tall fescue can be controlled by using **PLATEAU** at the rate of 12 oz per acre plus methylated seed oil at 2 pints per acre in established stands of or to prepare a seed bed for big bluestem, little bluestem, and indiangrass. The addition of nitrogen fertilizer (see "SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS" section) to the above mix will aid in control. Tall fescue must be actively growing for optimum control. If tall fescue has reached the boot stage or has reached summer dormancy, control may be poor. For improved control of tall fescue, **PLATEAU** may be tank mixed with ACCORD®, ROUNDUP® PRO, or glyphosate. Fall

applications of **PLATEAU® herbicide** at 8 to 12 oz/A plus 24 to 64 oz/A ACCORD® or ROUNDUP® PRO will result in best control of existing tall fescue and new germinating seedlings. With spring applications of **PLATEAU** at 6 to 12 oz/A, plus a ACCORD® or ROUNDUP® PRO at 32 to 64 oz/A, use higher rates for older, mature fescue stands and lower **PLATEAU** rates when planting forbs. When using 8 oz/A of **PLATEAU** in the fall with a glyphosate product, it is recommended to apply 4 oz/A **PLATEAU** in the spring at planting for annual weed and seedling fescue control. Burning the fescue stand, where permitted, the following spring, just prior to green-up, will aid in control and provide a better seedbed for planting. Mowing the fescue several times the summer before fall application will weaken the fescue root system, making it more susceptible to herbicides. Always allow for at least 10 inches of regrowth, following the last mowing before spraying, as both **PLATEAU** and glyphosate products need foliage present for herbicide uptake and satisfactory control.

TOLERANT GRASS SPECIES*

		Plateau herbicide	
Prairiegrass		Rate (oz/A)	
Common Name	Genus species	New Seeding	Established
Big Bluestem	<i>Andropogon gerardii</i>	2-12	2-12
Little Bluestem	<i>Schizachyrium scoparium</i>	2-12	2-12
Indiangrass	<i>Sorghastrum nutans</i>	2-12	2-12
Bushy Bluestem	<i>Andropogon glomeratus</i>	—*	2-12
King Ranch Bluestem	<i>Bothriochloa ischaemum</i>	—	2-12
Silver Beard Bluestem	<i>Bothriochloa saccharoides</i>	—	2-12
Broomsedge	<i>Andropogon virginicus</i>	—	2-12
Fingergrass, Rhodes grass	<i>Choris</i> spp.	—	2-12
Needlegrass	<i>Stipa</i> spp.	—	2-12
Needleandthread	<i>Stipa comata</i>	—	2-12
Kearny (Plains) Threeawn	<i>Aristida longespica</i>	—	2-12
Prairie Threeawn	<i>Aristida oligantha</i>	—	2-12
Prairie Sandreed	<i>Calamovilia longifolia</i>	—	2-12
Smooth Bromegrass	<i>Bromus inermis</i>	—	2-12
Kentucky Bluegrass	<i>Poa pratensis</i>	—	2-12 ¹
Sandberg's Bluegrass	<i>Poa sandbergii</i>	—	2-12
Wheatgrasses	<i>Agropyron</i> spp.	—	2-12
Bottlebrush Squirreltail	<i>Sitanian hystrix</i>	—	2-12
Russian Wild Ryegrass	<i>Elymus junceus</i>	2-6 ²	2-12
Sideoats Grama	<i>Bouteloua curtipendula</i>	2-8 ³	2-8
Blue Grama	<i>Bouteloua gracilis</i>	2-8 ³	2-8
Buffalograss	<i>Buchloe dactyloides</i>	2-4	2-8
Eastern Gamagrass	<i>Tripsacum dactyloides</i>	2-6 ³	2-8

¹See individual grass sections for application timing.

²High rates may result in stunting and growth suppression.

³**PLATEAU** preemergence applications to newly seeded sideoats, blue grama and Eastern gamagrass may result in thinning or loss of stand.

⁴Some bluegrass varieties are sensitive to **PLATEAU** herbicide. Drought can delay recovery and may result in overgrazing of treated area.

*Tolerance unknown

TOLERANCE OF ESTABLISHED GRASSES TO 8 TO 12 OZ/A OF PLATEAU APPLIED IN THE FALL

Grass Species*	Tolerant	Suppressed	Not Tolerant	Tolerance Unknown
Bermudagrass	X			
Bluegrass, Kentucky	X			
Bluegrass, Sandberg's	X			
Bluestem, big	X			
Bluestem, bushy	X			
Bluestem, King Ranch	X			
Bluestem, little	X			

Bluestem, silver beard	X
Brome grass, meadow	X X

TOLERANCE OF ESTABLISHED GRASSES TO 8 TO 12 OZ/A OF PLATEAU APPLIED IN THE FALL (CONT):

Grass Species*	Tolerant	Suppressed	Not Tolerant	Tolerance Unknown
Brome grass, smooth		X		
Broomsedge	X			
Buffalograss	X X			
Cheatgrass		X		
Creeping foxtail, Garrison			X	
Downey brome			X	
Fescue, Idaho	X			
Fescue, tall			X	
Gamagrass, eastern		X		
Grama, blue	X X			
Grama, sideoats	X X			
Indiangrass	X			
Medusahead			X	
Needleandthread	X			
Needlegrass, green	X			
Orchardgrass		X		
Prairie cordgrass		X		
Prairie dropseed			X	
Prairie sandreed	X			
Prairie threeawn	X			
Quackgrass	X			
Redtop	X X			
Reed canarygrass	X X			
Rhodes grass/Fingergrass	X			
Ryegrass, annual or Italian			X	
Ryegrass, perennial	X X			
Squirreltail, bottlebrush	X			
Switchgrass	X X			
Timothy			X	
Wheatgrass, bluebunch	X X			
Wheatgrass, crested	X X			
Wheatgrass, intermediate	X X			
Wheatgrass, pubescent	X X			
Wheatgrass, siberian	X			
Wheatgrass, slender	X X			
Wheatgrass, stream-bank	X X			
Wheatgrass, western	X X			
Wild ryegrass, Basin	X			
Wild ryegrass, Canada			X	
Wild ryegrass, Russian	X			
Wild ryegrass, Virginia			X	

¹ Species with an X in more than one column means tolerance will vary depending on variety, use rate and environmental conditions.

² Suppression may be expressed as reduction in number of seedheads, seedhead height suppression or foliage height reduction; however, full recovery of the grass can be expected.

WILDFLOWER ESTABLISHMENT AND MAINTENANCE

Due to high degree of variation in genotypes, ecotypes and varieties of wildflowers, tolerances to **PLATEAU** can vary dramatically and may be reduced under certain soil types and environmental conditions. Apply **PLATEAU** only if some stand thinning or loss can be tolerated. Preemergence applications of low use rates (2 oz/A) to tolerant species, result in the least amount of injury, but may not eliminate it. Postemergence applications of **PLATEAU** can result in injury or death of some genotypes, and should be used only as a rescue treatment when weed competition threatens the stand. Use of certain spray adjuvants can also increase wildflower injury and loss of stand. Although most legumes listed in the tolerance table are tolerant to 4 oz/A of **PLATEAU** preemergence, some stand thinning

may occur. Legumes are more tolerant to post applications, but chlorosis or stunting is possible. Recommendations listed in the tables below are designed for mixed grass/wildflower stands. Less than satisfactory results may occur from applications to monoculture stands. It is recommended to try on a small scale to determine degree of satisfaction on monoculture stands.

For prairiegrass/wildflower mixtures: Where some wildflower injury (phytotoxicity, height suppression) can be tolerated, apply **PLATEAU® herbicide** at the rate to achieve desired weed control, but not to exceed tolerance rate listed in the table below. Wildflower injury can be reduced or eliminated with preemergence applications. To minimize injury, apply **PLATEAU** at 2 to 4 oz per acre at planting to tolerant species listed below. Use the 2 oz per acre rate under cool dry conditions and in low rainfall areas. If postemergence application is made to established prairiegrass/wildflower mixtures, use the lowest rate of **PLATEAU** necessary to achieve desired weed control (see "WEEDS CONTROLLED" section). Postemergence application can result in stand thinning or death due to vast variation in seed sources, varieties and genotypes. It is recommended that a small area be tested prior to full application for tolerance of desired species. The rates listed below are for those species in which acceptable tolerance has been confirmed on the varieties/genotypes being treated.

Application of **PLATEAU** in conjunction with an organophosphate insecticide may cause an increase in wildflower injury.

**Seedling Wildflower and Legume
Tolerance to PLATEAU
(4 oz/A)¹ in Mixed Grass/Forb Stands.**

Common Name	Genus Species	PRE	POST
Alfalfa	<i>Medicago sativa</i>	No	Yes
Aster, New England	<i>Aster novae angiae</i>	No	Yes
Aster, Prairie	<i>Aster tanacetifolius</i>	No	Yes
Baby Blue Eyes	<i>Nemophila menziesii</i>	No	Yes
Beggar ticks	<i>Bidens frondosa</i>	No	Yes
Bird's Eyes	<i>Gilia tricolor</i>	No	Yes
Bishop's Flower	<i>Anuni majus</i>	No	Yes
Blackeyed Susan	<i>Rudbeckia hirta</i>	Yes	Yes
Blanketflower	<i>Gaillardia aristata</i>	No	Yes
Bundleflower, Illinois	<i>Desmanthus illinoensis</i>	Yes	Yes
Catchfly	<i>Silene armeria</i>	No	Yes
Chicory	<i>Cichorium intybus</i>	Yes	Yes
Clover, Crimson	<i>Trifolium incarnatum</i>	Yes	Yes
Clover, White	<i>Trifolium repens</i>	No	Yes
Coneflower, Purple	<i>Echinacea purpurea</i>	Yes	Yes
Coneflower, Upright Prairie	<i>Ratibida columnifera</i>	Yes	Yes
Coreopsis, Dwarf Red Plains	<i>Coreopsis tinctoria</i> var. <i>Gay Feather</i>	Yes	Yes
Coreopsis, Lance Leaved	<i>Coreopsis lanceolata</i>	Yes	Yes
Coreopsis, Plains	<i>Coreopsis tinctoria</i>	Yes	Yes
Cornflower	<i>Centaurea cyanus</i>	No	Yes
Cosmos, Garden	<i>Cosmos bipinnatus</i>	Yes	Yes
Cosmos, Yellow	<i>Cosmos sulphureus</i>	Yes	Yes
Daisy, Ox-eye ³	<i>Chrysanthemum leucanthemum</i>	Yes	Yes
Daisy, Shasta	<i>Chrysanthemum maximum</i>	Yes	Yes
Five Spot	<i>Nemophila maculata</i>	No	Yes
Flax, Blue	<i>Linum perenne</i>	No	Yes
Indian Blanket	<i>Gaillardia pulchella</i>	No	Yes
Indigo, Blue False	<i>Baptisia australis</i>	Yes	No
Johnny Jump-ups	<i>Viola cornuta</i>	Yes	Yes
Lemon Mint	<i>Monarda citriodora</i>	No	Yes
Lespedeza, Bicolor	<i>Lespedeza</i>	Yes	Yes
Lespedeza, Korean	<i>Lespedeza stipulacea</i>	No	Yes
Lespedeza, Sericea	<i>Lespedeza cuneata</i>	No	Yes
Lupine, Perennial	<i>Lupinus perennis</i>	Yes	Yes
Mexican Hat	<i>Ratibida columnifera</i>	Yes	Yes
Partridgepea	<i>Cassia fasciculata</i>	Yes	Yes

Pea, Calico	<i>Pisum viganasinensis</i>	Yes	Yes
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**Seedling Wildflower and Legume
Tolerance to PLATEAU
(4 oz/A)¹ in Mixed Grass/Forb Stands.(CONT):**

Common Name	Genus Species	PRE	POST
Pea, Flat	<i>Lathyrus sylvestris</i>	Yes	Yes
Pea, Perennial	<i>Lathyrus latifolius</i>	Yes	Yes
Phlox, Drummond	<i>Phlox drummondii</i>	Yes	No
Poppy, California	<i>Eschscholzia californica</i>	Yes	No
Poppy, Corn	<i>Papaver rhoes</i>	Yes	Yes
Poppy, Red Corn	<i>Papaver sp.</i>	Yes	Yes
Prairieclover, Purple	<i>Dalea purpurea</i>	Yes	Yes
Prairieclover, White	<i>Dalea candidum</i>	Yes	Yes
Tick-trefoil, Showy	<i>Desmodium canadense</i>	No	Yes
Trefoil, Birdfoot	<i>Lotus corniculatus</i>	No	Yes
Vetch, Crown	<i>Coronilla varia</i>	Yes	—
Vetch, Hairy	<i>Vicia villosa</i>	Yes	—
Yarrow, Gold	<i>Achillea filipendulina</i>	No	Yes

¹ For legumes, at least three true leaves should be present before a postemergence application.

**Established Wildflower and Legume
Tolerance to PLATEAU
(maximum rate¹, oz/A)
in Mixed Grass/Forb Stands.**

Common Name	Genus Species	PRE	POST
Flax, Blue	<i>Linum perenne</i>	0	6
Indian Blanket	<i>Gaillardia pulchella</i>	0	6
Blanketflower	<i>Gaillardia aristata</i>	0	8
Chickory	<i>Cichorium intybus</i>	4	6
Daisy, Shasta	<i>Chrysanthemum maximum</i>	4	8
Prairieclover, Purple	<i>Dalea purpurea</i>	4	12
Coneflower, Upright Prairie	<i>Ratibida columnifera</i>	6	6
Mexican Hat	<i>Ratibida columnifera</i>	6	6
Poorjoe	<i>Diiodia teres</i>	8	—
Lupine, Perennial ²	<i>Lupinus perennis</i>	8	12
Coneflower, Purple	<i>Echinacea purpurea</i>	8	8
Daisy, Ox-eye ³	<i>Chrysanthemum leucanthemum</i>	8	8
Leadplant	<i>Amorpha canescens</i>	8	8
Lespedeza, Bicolor	<i>Lespedeza</i>	8	8
Milkweed, Common	<i>Asclepias syriaca</i>	8	—
Pea, Prairie Scurf	<i>Psoralea esculenta</i>	8	8
Yarrow, Gold ⁴	<i>Achillea filipendulina</i>	8	8
Blackeyed Susan	<i>Rudbeckia hirta</i>	8	10
Johnny Jump-ups	<i>Viola cornuta</i>	8	12
Sweetclover	<i>Melilotus sp.</i>	12	8
Alfalfa	<i>Medicago sativa</i>	12	12
Blanketflower, Illinois	<i>Desmanthus illinoensis</i>	12	12
Lespedeza, Sericea	<i>Lespedeza cuneata</i>	12	12
Partridgepea	<i>Cassia fasciculata</i>	12	12
Sensitive vine	<i>Mimosa strigillosa</i>	12	12
Vetch, Crown	<i>Coronilla varia</i>	12	12
Violet, Wild	<i>Viola spp.</i>	12	12

¹ Height suppression or stand reduction may occur at maximum use rate. For legumes, some yellowing and stunting can occur at higher use rates.

² Postemergence application should be made early post on the flowers to reduce injury and increase flower set.

³ Will not flower.

⁴ Most native rangeland lupines are tolerant to PLATEAU herbicide at 12 oz/A postemergence.

**Wildflower Establishment with PLATEAU
4 oz/A + PENDULUM herbicide 2 lbs a.i./A¹**

Common Name	Genus Species	PRE ²	POST ³
Blackeyed Susan	<i>Rudbeckia hirta</i>	Yes	Yes
Blanketflower	<i>Gaillardia pulchella</i>	No	Yes

**Wildflower Establishment with PLATEAU® herbicide
4 oz/A + PENDULUM® herbicide 2 lbs a.i./A¹**

Common Name	Genus Species	PRE ²	POST ³
Bundleflower, Illinois	<i>Desmanthus illinoensis</i>	>50% thinning	Yes
Clover, Crimson	<i>Trifolium incarnatum</i>	>50% thinning	Yes
Coneflower, Clasping	<i>Dracopis amplexicaulis</i>	Yes	Yes
Coneflower, Upright Prairie	<i>Ratibida columnifera</i>	No	OK
Coneflower, Purple	<i>Echinacea purpurea</i>	Yes	Yes
Coreopsis, Dwarf Red Plains	<i>Coreopsis tinctoria</i> var. Gay Feather	OK stunting	OK stunting
Coreopsis, Plains	<i>Coreopsis tinctoria</i>	OK stunting	Yes
Coreopsis, Lance Leaved	<i>Coreopsis lanceolata</i>	25% thinning	Yes
Cornflower	<i>Centaurea cyanus</i>	No 20% thinning	OK
Cosmos, Garden	<i>Cosmos bipinnatus</i>	OK 10% thinning	OK stunting
Cosmos, Yellow	<i>Cosmos sulphureus</i>	Yes	Yes
Daisy, Ox-eye	<i>Chrysanthemum leucanthemum</i>	25% thinning	Yes
Daisy, Shasta	<i>Chrysanthemum maximum</i>	marginal-OK 20% thinning	Yes
Lupine, Perennial	<i>Lupinus perennis</i>	Yes	≤50% thinning
Partridgepea	<i>Cassia fasciculata</i>	25% thinning	Yes
Poppy, California	<i>Eschscholzia californica</i>	Yes	25% injury stunting, thinning
Yarrow, Gold	<i>Achillea filipendulina</i>	OK thinning	OK

¹ 2 lbs a.i./A = 2.4 qts of PENDULUM herbicide 3.3 EC or 3.3 lbs of PENDULUM herbicide WDG

² Preemergence at planting

³ Postemergence to seedlings

Yes = no injury

No = results in no wildflower germination or unacceptable injury to seedling flowers.

OK = can be used if thinning and/or stunting can be tolerated or if establishment is threatened by weed competition.

Due to the diversity of species and varieties that exist in areas where wildflowers are grown, the response to PLATEAU may vary greatly. Careful testing on desirable species is recommended to determine if area-wide applications can be made. Try on a limited area to verify tolerance in a specific area.

The suitability of PLATEAU use on wildflower species not listed, should be determined by treating a small number of such wild flowers at an appropriate rate, not to exceed 12 oz per acre per year. Treated wildflowers should be evaluated 1 to 2 months following application for possible injury. THE USER ASSUMES RESPONSIBILITY FOR ANY DAMAGE OR OTHER LIABILITY.

SPECIAL WEED CONTROL

ALWAYS ADD AN ADJUVANT to PLATEAU (see "SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS" section). Research has shown Methylated Seed Oil (MSO) surfactants provide PLATEAU with superior control of perennial weeds. This effect is not always observed and is most prevalent on waxy leaf species, perennials and weeds under stress conditions. For the weeds listed below, it is recommended to use a MSO for best results. The use of nonionic surfactants or silicone based surfactants may result in less than acceptable control.

Johnsongrass & Itchgrass: For best results, apply PLATEAU at the rate of 8 to 12 oz per acre after johnsongrass or itchgrass has reached 18 to 24 inches in height at the whorl. The addition of ACCORD[®] or ROUNDUP[®] PRO at the rate of 8 to 16 oz per acre may improve control after culm elongation or in dense stands. Use higher herbicide rates as density increases. Larger grass than specified above can be controlled.

Dallisgrass, Bahiagrass, Vaseygrass, Paspalum spp., Smutgrass: For dallisgrass, bahiagrass and smutgrass control,

apply PLATEAU postemergence at the rate of 10 to 12 oz per acre, after grass has reached 100% green-up. For dallisgrass and smutgrass, activity may range from suppression to control depending upon grass growth stage and growing conditions at the time of application. For vaseygrass apply PLATEAU at the rate of 4 to 6 oz per acre postemergence after grass has reached 100% green-up and is from 3 to 8 inches in height. The addition of ACCORD[®] or ROUNDUP[®] PRO at the rate of 12 to 16 oz per acre will improve efficacy. Use higher herbicide rates as target grass weed densities and/or maturity increase. The addition of PENDULUM[®] will provide increased preemergence control of these grasses from seed.

Leafy Spurge: For best results, apply PLATEAU at 8 to 12 oz per acre in late summer or fall (August through October, but timing may vary by state and/or altitude). Consecutive year applications will optimize long term control. PLATEAU at 12 oz/A applied spring or fall, or 4 oz/A in the spring following an 8 oz/A fall treatment may result in excessive injury to cool season grasses in some areas. For best results, always use a methylated seed oil at 2 pints per acre. Two pints per acre of nitrogen fertilizer (see "SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS" section) may also be added to the spray tank to increase leafy spurge control, however, this may increase injury to desired species of grasses and forbs. The use of nonionic and silicone based surfactants have resulted in little or no control of leafy spurge. Approximate dates for fall timing in North and South Dakota is late August through September; for Nebraska and Iowa is mid-September through mid-October. This application should be made after good soil moisture is present but prior to the leafy spurge losing its milky sap flow due to a killing frost. To check and see if the milky sap flow has been affected by a frost simply break the main stem of the leafy spurge and if milky sap flows from the break then PLATEAU can still be applied.

Tall Fescue Control: Tall fescue can be controlled by using PLATEAU at the rate of 12 oz plus Methylated Seed Oil at 2 pints per acre. The addition of ACCORD, glyphosate or ROUNDUP PRO and/or nitrogen fertilizer (see "SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS" section) to the above mix will aid in control. Tall fescue must be actively growing for optimum control. If tall fescue has reached summer dormancy, control may be poor.

Fall applications of PLATEAU at 8 to 12 oz/A plus a ACCORD[®] or ROUNDUP[®] PRO at 24 to 64 oz/A will result in best control of existing tall fescue and new germinating seedlings. With spring applications of PLATEAU at 6 to 12 oz/A, plus ACCORD or ROUNDUP PRO at 32 to 64 oz/A, use higher rates for older, mature fescue stands and lower PLATEAU rates when planting forbs. When using 8 oz/A of PLATEAU in the fall with ACCORD or ROUNDUP PRO, it is recommended to apply 4 oz/A PLATEAU in the spring at planting for annual weed and seedling fescue control. Burning the fescue stand, where permitted, the following spring, just prior to green-up, will aid in control and provide a better seedbed for planting. Mowing the fescue several times the summer before fall application, will weaken the fescue root system, making it more susceptible to herbicides. Always allow for at least 10 inches of regrowth, following the last mowing before spraying, as both PLATEAU and ROUNDUP products need foliage present for herbicide uptake and satisfactory control.

Russian Knapweed: Apply 12 oz/A of PLATEAU plus 1 quart per acre of methylated seed oil during Russian knapweed senescence in the fall. Control improves as senescence progresses and may still be obtained with applications made after full senescence. Applications made prior to the initiation of senescence will result in reduced control.

Dalmatian Toadflax: Apply 12 oz/A of PLATEAU plus 1 quart per acre of methylated seed oil in the fall when the top 25% of the plant is necrotic, usually after a hard frost (late October through November). The addition of ammonium sulfate at a rate of 2 to 3 pints per acre may improve control. As long as there is some green stem and/or leaf tissue remaining, good control can be achieved. This timing usually corresponds to fall basal growth. Applications made prior to this will result in poor control.

Resistant Biotypes: Naturally occurring biotypes (a plant within a given species that has a slightly different, but distinct genetic makeup from other plants of the same species) of some weeds listed on this label may not be effectively controlled by this and/or other herbicides (OUST[®]) with the ALS/AHAS enzyme inhibiting mode of action. If naturally occurring ALS/AHAS resistant biotypes are present in an area, PLATEAU should be tank-mixed or applied sequentially with an appropriate registered herbicide having a different mode of action to ensure control.

For sensitive areas and use around desirable vegetation **PLATEAU® herbicide** at 12 ounces per acre may be tank mixed with PENDULUM® herbicide, ROUNDUP® PRO, ESCORT®, KARMEX®, 2,4-D, diuron, ENDURANCE® or other labeled products to provide total vegetation control. For other bareground areas **PLATEAU** at 12 oz per acre may be tank mixed with ARSENAL® herbicide, SAHARA® DG herbicide, KROVAR®, OUST®, TORDON®, VANQUISH® or other labeled products to provide total bareground weed control. For maximum weed control, use 2 pints per acre of methylated seed oil as an adjuvant.

Spot Treatments: **PLATEAU** may be used to control weed encroachment in bareground or total vegetation control situations. To prepare the spray solution, thoroughly mix in each gallon of water 0.25 to 5% volume/volume (0.3 oz to 5.4 oz per gallon) **PLATEAU** plus a methylated seed oil adjuvant.

USE UNDER PAVED SURFACES

Applications should be made to the soil surface only when final grade is established. DO NOT move soil following **PLATEAU** application. Apply **PLATEAU** in sufficient water to ensure thorough and uniform wetting of the soil surface, including the shoulder area. Add **PLATEAU** at a rate of 12 oz. per acre to clean water in the spray tank during the filling operation. Agitate before spraying. If soil is not moist prior to treatment, incorporation of **PLATEAU** will improve control. **PLATEAU** can be incorporated into the soil to a depth of two inches using a rototiller or disc. Rainfall or irrigation totaling one inch is also sufficient to incorporate **PLATEAU** into the soil surface. DO NOT allow treated soil to wash or move into untreated area.

TOLERANCE OF TREES AND BRUSH TO PLATEAU

The following tolerance information is provided as a general guideline when it is desirable or necessary to make **PLATEAU** applications in and around desirable tree and brush species. DO NOT use **PLATEAU** on nursery, orchard, ornamental plantings, new plantings, seedling trees or fiber farms except as specified on supplemental labeling. It is suggested that **PLATEAU** be tried on a limited basis to determine tolerance in your area. **PLATEAU** may be used at rates up to 12 oz per acre for weed control in and around established trees on pasture, rangeland (see "GUIDELINES FOR RANGELAND USE" section) and noncropland areas such as roadsides, prairies and similar areas used for wildlife cover, erosion control, wind breaks, etc. Tree and brush species known to have acceptable tolerance to **PLATEAU** when applied under the canopy and/or to the foliage are listed below. Tolerance is based upon trees with a minimum of 2 inch DBH. Application to tree and brush species that are under stress due to drought, disease, insect damage or other factors may be more susceptible to injury from **PLATEAU** and may result in severe injury or death. Some species may exhibit tip chlorosis and minor necrosis. Foliar contact may increase injury to include defoliation and terminal death. Application methods that minimize foliar contact with desirable tree and brush species can improve tolerance.

When making fall applications of **PLATEAU**, potential injury to tree and brush species from foliar contact may be minimized by making the application after the leaves have begun to senesce (fall color) or after leaf drop. Conifer species are generally tolerant to fall applications. **PLATEAU** applications in and around tree and brush species should be made at the recommended timing for the target weed species.

Brush and Tree Species Tolerance to PLATEAU at 12 oz per Acre¹

Common Name	Genus Species	Tolerance by Application Method ²	
		Directed Below Foliage	To Foliage
Apple (Var. Winesap) ³	<i>Malus sylvestris</i>	Yes	NR
Ash, Blue	<i>Fraxinus quadrangulata</i>	Yes	NR
Ash, Green	<i>Fraxinus pennsylvanica</i>	No	No
Azalea	<i>Rhododendron</i> spp.	No	No
Basswood	<i>Tilia heterophylla</i>	No	No
Boxelder	<i>Acer negundo</i>	Yes	Injury ⁵

Brush and Tree Species Tolerance to PLATEAU at 12 oz per Acre¹

Common Name	Genus Species	Tolerance by Application Method ²	
		Directed Below Foliage	To Foliage
Buckeye, Ohio	<i>Aesculus glabra</i>	Yes	NR
Cedar-juniper, Western	<i>Thuja plicata</i>	Yes	Yes
Cherry, Black ³	<i>Prunus serotina</i>	No	No
Cherry, Choke	<i>Prunus virginiana</i>	No	No
Cherry, Sweet ³	<i>Prunus avium</i>	No	NR
Cottonwood	<i>Populus deltoides</i>	Yes	Injury ⁵
Cottonwood, narrow leaf	<i>Populus</i> spp.	Yes	Injury ⁵
Currant species	<i>Ribes</i> spp.	Injury ⁵	No
Dogwood, Flowering	<i>Cornus</i> spp.	Yes	Yes
Dogwood, Grey	<i>Cornus racemosa</i>	Yes	Injury ⁵
Dogwood, Red Trig	<i>Cornus</i> spp.	Yes	Yes
Douglas Fir	<i>Pseudotsuga menziesii</i>	Yes	Yes ⁴
Elm, American	<i>Ulmus americana</i>	Yes	Yes
Elm, Siberian	<i>Ulmus pumila</i>	Yes	No
Elm, Slippery	<i>Ulmus rubra</i>	Yes	Yes
Gooseberry	<i>Ribes</i> spp.	Injury ⁵	Injury ⁵
Hackberry	<i>Celtis occidentalis</i>	Yes	Yes
Hawthorn	<i>Crataegus</i> spp.	Yes	Injury ⁵
Juniper, Chinese	<i>Juniperus chinensis</i>	Yes	Yes
Juniper, Western	<i>Juniperus osteosperma</i>	Yes	Yes
Lilac	<i>Syringa</i> spp.	No	No
Linden, American	<i>Tilia americana</i>	No	No
Locust, Black	<i>Robinia pseudoacacia</i>	Yes	Yes
Locust, Honey	<i>Gleditsia triacanthos</i>	Yes	Yes
Maple, Red	<i>Acer rubrum</i>	Yes	Yes
Maple, Sugar	<i>Acer saccharum</i>	Yes	Yes
Mulberry, Red	<i>Morus rubra</i>	Yes	NR
Mulberry, White	<i>Morus alba</i>	Yes	NR
Oak, Black	<i>Quercus velutina</i>	Yes	NR
Oak, Live	<i>Quercus virginiana</i>	Yes	Yes
Oak, Southern Red	<i>Quercus falcata</i>	Yes	NR
Oak, White	<i>Quercus alba</i>	Yes	NR
Olive, Russian	<i>Elaeagnus angustifolia</i>	Yes	No
Osage Orange	<i>Maclura pomifera</i>	Yes	NR
Peach (Var. Elberta) ³	<i>Prunus persica</i>	Yes	NR
Photinia, Red Tip	<i>Photinia fraseri</i>	Yes	Yes
Pine, Lodgepole	<i>Pinus contorta</i>	Yes	Injury ¹
Pine, White ⁴	<i>Pinus strobus</i>	Yes	Yes
Pittosporum, Japanese	<i>Pittosporum tobira</i>	Yes	Yes
Plum species	<i>Prunus</i> spp.	Yes	No
Poplar, Yellow (Tulip)	<i>Liriodendron tulipifera</i>	Yes	NR
Privet, Common	<i>Ligustrum vulgare</i>	Yes	Yes
Rabbitbrush species	<i>Chrysothamnus</i> spp.	Yes	Yes
Redbud	<i>Cercis canadensis</i>	Yes	Yes
Redcedar, Eastern	<i>Juniperus virginiana</i>	Yes	Yes
Rose, Multiflora	<i>Rosa multiflora</i>	Yes ⁵	No
Sage, Big	<i>Artemisia tridentata</i>	Yes	Yes
Sage, Fringe	<i>Artemisia frigida</i>	Yes	Yes
Sage, Silver	<i>Artemisia cana</i>	Yes	Yes
Sagebrush, Big	<i>Artemisia tridentata</i>	Yes	Yes
Sagebrush, Fringed	<i>Artemisia frigida</i>	Yes	Yes
Saltcedar	<i>Tamarix</i> spp.	Yes	No
Serviceberry	<i>Amelanchier alnifolia</i>	Yes	NR
Snowberry, Western	<i>Symporicarpus occidentalis</i>	Yes	Injury ⁵

Brush and Tree Species Tolerance to PLATEAU® herbicide at 12 oz per Acre¹ (CONT):

Common Name	Genus Species	Tolerance by Application Method ²	
		Directed Below Foliage	To Foliage
Spruce species	<i>Picea</i> spp.	Yes ⁴	Yes ⁴
Sugarberry	<i>Celtis laevigata</i>	Yes	Yes
Sweetgum	<i>Liquidambar styraciflua</i>	Yes	Yes ⁵
Sycamore	<i>Platanus occidentalis</i>	Yes	No
Tree-of-Heaven	<i>Ailanthus altissima</i>	Yes	Yes
Walnut, American Black	<i>Juglans nigra</i>	Yes	No
Willow	<i>Salix</i> spp.	Yes	Injury ⁵

¹Not intended for nursery, orchard, ornamental plantings, new plantings or seedling trees.

²Yes = Tolerant

No = Not Tolerant. Severe injury or death

NR = Not Recommended due to insufficient tolerance data

³Not for use on ornamental or fruit bearing trees.

⁴Applications made just before or during candling may cause candle injury or death.

⁵Possible defoliation and/or death. Some species may exhibit tip chlorosis and minor necrosis. If spray contacts foliage then defoliation and terminal death may occur. Injury can be reduced or eliminated if applied in fall after color change or leaf drop.

⁶See supplemental label. "For Use In Sweetgum (*Liquidambar styraciflua*) Grown on Fiber Farms."

WEEDS CONTROLLED

PLATEAU, 4 to 6 oz per acre

Common Name	Genus Species	Annual/ Biennial/ Perennial ³		
		PRE	POST	Perennial ³
BROADLEAVES				
Bedstraw, Catchweed	<i>Galium aparine</i>	C	4	WA
Beggarweed, Florida	<i>Desmodium tortuosum</i>	C	2	SA
Buffalobur	<i>Solanum rostratum</i>	—	C	SA
Buttercup, Bur	<i>Ranunculus testiculatus</i>	C	C	WA
Cocklebur, Common	<i>Xanthium strumarium</i>	S	6	SA
Lambsquarters, Common	<i>Chenopodium album</i>	C	2	SA
Halogeton	<i>Halogeton glomeratus</i>	C	C	SA
Morningglory				
Entireleaf	<i>Ipomoea hederacea</i>	S	3	SA
Ivyleaf	<i>Ipomoea hederacea</i>	S	3	SA
Tall	<i>Ipomoea purpurea</i>	S	3	SA
Mustard, Wild	<i>Brassica kaber</i>	C	C	WA
Pigweed	<i>Amaranthus</i> sp.	C	6	SA
Queen Anne's Lace	<i>Daucus carota</i>	—	4	B
Radish, Wild	<i>Raphanus raphanistrum</i>	S	4	WA
Yellow Rocket	<i>Barbara vulgaris</i>	C	4	WA
Sicklepod	<i>Senna obtusifolia</i>	C	4	SA
Sida, Prickly	<i>Sida spinosa</i>	C	2	SA
Smartweed				
Ladysthumb	<i>Polygonum persicaria</i>	C	C	SA
Pennsylvania	<i>Polygonum pensylvanicum</i>	C	C	SA
Swamp	<i>Polygonum coccineum</i>	C	C	SA
Starbur, Bristly	<i>Acanthospermum hispida</i>	C	2	SA
Velvetleaf	<i>Abutilon theophrasti</i>	C	6	SA
GRASS WEEDS				
Brome, Downy	<i>Bromus tectorum</i>	C	2	WA
Cheat	<i>Bromus secalinus</i>	C	2	WA
Crabgrass				
Large (Hairy)	<i>Digitaria sanguinalis</i>	C	4	SA
Smooth	<i>Digitaria ischaemum</i>	C	4	SA

GRASS WEEDS (CONT.)

Foxtail,				
Giant	<i>Setaria faberi</i>	C	6	SA
Green	<i>Setaria viridis</i>	C	4	SA
Yellow	<i>Setaria glauca</i>	C	4	SA
Goatgrass, Jointed	<i>Aegilops cylindrica</i>	C	C	WA
Goosegrass	<i>Elusine indica</i>	S	2	SA
Johnsongrass (Seedling)	<i>Sorghum halepense</i>	C	12	SA
Medusahead	<i>Taeniatherum caput-medusae</i>	C	2	WA
Panicum, Fall	<i>Panicum dichotomiflorum</i>	S	6	SA
Sandbur	<i>Cenchrus</i> sp.	S	C	A/P
Shattercane	<i>Sorghum bicolor</i>	C	12	SA
Signalgrass, Broadleaf	<i>Brachiaria platyphylla</i>	C	C	SA
Stiltgrass, Japanese	<i>Microstegium vimineum</i>	C	4	A
Vaseygrass	<i>Paspalum urvillei</i>	—	8	P
SEDGES				
Nutsedge				
Yellow	<i>Cyperus esculentus</i>	S	4S	P
Purple	<i>Cyperus rotundus</i>	S	4S	P
Sedge	<i>Juncus</i> sp.	S	4S	A/P

¹C = control, S = suppression in northern United States only

²Maximum plant height in inches at time of application

³Growth habit: A=Annual, SA=Summer Annual, WA=Winter Annual, B=Biennial, P=Perennial

PLATEAU, 8 to 12 oz per acre

Common Name	Genus Species	Annual/ Biennial/ Perennial ³		
		PRE	POST	Perennial ³
BROADLEAVES:				
Anoda, Spurred	<i>Anoda cristata</i>	C	6	SA
Baby's Breath ⁵	<i>Gypsophila paniculata</i>	—	C	P
Bedstraw, Catchweed	<i>Galium aparine</i>	C	C	WA
Bedstraw, Marsh	<i>Galium</i> spp.	C	C	WA
Begganweed, Florida	<i>Desmodium tortuosum</i>	C	6	SA
Bindweed, Field	<i>Convolvulus arvensis</i>	—	C	P
Buffalobur	<i>Solanum rostratum</i>	—	C	SA
Burclover	<i>Medicago</i> sp.	—	4	SA
Chickweed, Common	<i>Stellaria media</i>	C	6	SA
Cocklebur, Common	<i>Xanthium strumarium</i>	C	6	SA
Cornsalad, Common	<i>Valerianella locusta</i>	C	WA	
Crownbeard, Golden	<i>Verbisina encelioides</i>	C	2	SA
Dandelion	<i>Taraxacum officinale</i>	—	C	P
Dock, Curly	<i>Rumex crispus</i>	C	6	B
Fiddleneck	<i>Amsinckia</i> sp.	—	C	SA
Flax, Spurge	<i>Thymelaea passerina</i>	C	C	A
Fleabane, Annual	<i>Erigeron annuus</i>	—	C	A
Geranium, Carolina	<i>Geranium carolinianum</i>	—	C	WA/B
Geranium, Cranesbill	<i>Geranium maculatum</i>	C	C	WA/B
Ground Cherry	<i>Physalis heterophylla</i>	—	C	P
Hemlock, Poison	<i>Conium maculatum</i>	C	6	B
Henbit	<i>Lamium amplexicaule</i>	C	3	WA/B
Hoary Cress	<i>Cardaria</i> spp.	—	C	P
Houndstongue, Bristly	<i>Cynoglossum officinale</i>	C	C	B
Indigo, Hairy	<i>Indigofera hirsuta</i>	C	2	P
Jimsonweed	<i>Datura stramonium</i>	C	6	SA
Knapweed, Russian ⁶	<i>Centaurea repens</i>	—	C*	P
Knotweed, Prostrate	<i>Polygonum aviculare</i>	C	C	SA
Kochia ⁷	<i>Kochia scoparia</i>	C	3	SA
Lambsquarters, Common	<i>Chenopodium album</i>	C	3	SA

PLATEAU® herbicide, 8 to 12 oz per acre (CONT):

Common Name	Common Species	PRE	POST	Annual/ Biennial/ Perennial ¹
BROADLEAVES				
Morningglory				
Cypressvine	<i>Ipomoea quamoclit</i>	C	6	SA
Entireleaf	<i>Ipomoea hederacea</i>	C	6	SA
IVyleaf	<i>Ipomoea hederacea</i>	C	6	SA
Pitted	<i>Ipomoea lacunosa</i>	C	6	SA
Smallflower	<i>Jacquemontia tamnifolia</i>	C	6	SA
Tall	<i>Ipomoea purpurea</i>	C	6	SA
Mustard, Wild	<i>Brassica kaber</i>	C	C	WA
Onion, Wild	<i>Allium canadense</i>	C	C	P
Pepperweed, Perennial	<i>Lepidium latifolium</i>	—	C	P
Pigweed ⁴	<i>Amaranthus</i> sp.	C	6	SA
Plantain, Narrowleaf	<i>Plantago lanceolata</i>	C	C	B
Poinsettia, Wild	<i>Euphorbia heterophylla</i>	C	6	SA
Puncture Vine	<i>Tribulus terrestris</i>	—	C	SA
Purslane, Common	<i>Portulaca oleracea</i>	C	4	SA
Pusley, Florida	<i>Richardia scabra</i>	C	4	SA
Queen Anne's Lace	<i>Daucus carota</i>	C	C	B
Ragweed				
Common	<i>Ambrosia artemisiifolia</i>	C	3	SA
Giant	<i>Ambrosia trifida</i>	S	6	SA
Western	<i>Ambrosia psilostachya</i>	—	C	A/P
Rocket, Yellow	<i>Barbarea vulgaris</i>	C	C	WA
Senna, Coffee	<i>Cassia occidentalis</i>	C	4	SA
Sicklepod	<i>Senna obtusifolia</i>	C	6	SA
Sida, Prickly	<i>Sida spinosa</i>	C	6	SA
Smartweed				
Ladysthumb	<i>Polygonum persicaria</i>	C	C	SA
Pennsylvania	<i>Polygonum pensylvanicum</i>	C	C	SA
Swamp	<i>Polygonum coccineum</i>	C	C	SA
Spurge				
Leafy	<i>Euphorbia esula</i>	—	FALL*	P
Spotted	<i>Euphorbia maculata</i>	C	4	SA
Toothed	<i>Euphorbia dentata</i>	C	4	SA
Starbur, Bristly	<i>Acanthospermum hispida</i>	—	6	SA
Sunflower	<i>Helianthus annuus</i>	—	18	SA
Tansymustard	<i>Descurainia pinnata</i>	C	C	WA
Teasel, Common	<i>Dipsacus fullonum</i>	—	C	B
Thistle				
Bull	<i>Cirsium vulgare</i>	S	C	WA/B
Musk	<i>Carduus nutans</i>	S	C	B
Platt	<i>Cirsium canescens</i>	S	C	P
Russian*	<i>Salsola ibérica</i>	C	3	A
Toadflax, Dalmatian	<i>Linaria dalmatica</i>	—	C*	P
Velvetleaf	<i>Abutilon theophrasti</i>	C	C	A
Vervain, Blue	<i>Verbena hastata</i>	—	S	WA
Vervain, prostrate	<i>Verbena bracteata</i>	—	C	P
Whitetop	<i>Cardaria</i> spp.	—	C	P
Willowherb	<i>Epilobium</i> spp.	—	C	P
Woodsorrel, Yellow	<i>Oxalis stricta</i>	C	C	P
GRASS				
Bahiagrass	<i>Paspalum nutatum</i>	S	C*	P
Barley, Little	<i>Hordeum pusillum</i>	C	4	WA
Barley, Squirrel Tail	<i>Hordeum jubatum</i>	—	C	P
Barnyardgrass	<i>Echinochloa crus-galli</i>	C	6	SA
Cheat	<i>Bromus secalinus</i>	C	C	WA
Crabgrass	<i>Digitaria</i> sp.	C	6	SA
Crowfootgrass	<i>Dactyloctenium aegyptium</i>	C	C	SA
Dallisgrass	<i>Paspalum dilatatum</i>	S	C*	P

Common Name POST ²	Genus-Specific Perennials	PRE	POST	Annual/ Biennial/ Perennial ³
GRASS (CONT):				
Downy Brome	<i>Bromus tectorum</i>	C	C	WA
Dropseed, Tall	<i>Sporobolus cryptandrus</i>	S	C	A/P
Fescue, Tall	<i>Festuca arundinacea</i>	C	C*	P
Foxtail				
Giant	<i>Setaria faberi</i>	C	C	SA
Green	<i>Setaria viridis</i>	C	C	SA
Knotroot	<i>Setaria geniculatus</i>	S	6	SA
Purple Robust	<i>Setaria viridis</i>	S	S	SA
Yellow	<i>Setaria glauca</i>	C	4	SA
Garlic, Wild	<i>Allium vineale</i>	C	C	P
Goosegrass	<i>Elusine indica</i>	C	3S	SA
Itchgrass	<i>Rottboellia cochinchinensis</i>	—	C*	SA
Johnsongrass				
Seedling	<i>Sorghum halepense</i>	C	C	SA
Rhizome	<i>Sorghum halepense</i>	—	C*	P
Medusahead	<i>Taeniatherum caput-medusae</i>	C	C	WA
Panicum				
Fall	<i>Panicum dichotomiflorum</i>	C	C	SA
Texas	<i>Panicum texanum</i>	C	C	SA
Ryegrass, Annual (Italian)	<i>Lolium multiflorum</i>	C	C	WA
Ryegrass, Perennial	<i>Lolium perenne</i>	—	C	P
Sandbur	<i>Cenchrus</i> sp.	S	C	A/P
Shattercane	<i>Sorghum bicolor</i>	C	C	SA
Signalgrass, Broadleaf	<i>Bracharia platyphylla</i>	C	C	SA
Smutgrass	<i>Sporobolus indicus</i>	—	C	P
Stiltgrass, Japanese	<i>Microstegium vimineum</i>	C	C	A
Stinkgrass, Annual	<i>Eragrostis cilianensis</i>	C	2	SA
Torpedograss	<i>Panicum repens</i>	—	C	P
Vaseygrass	<i>Paspalum urvillei</i>	C	C	P
Wild Oats	<i>Avena fatua</i>	—	C	WA
SEDGES/RUSHES				
Nutsedge				
Yellow	<i>Cyperus esculentus</i>	C	C	P
Purple	<i>Cyperus rotundus</i>	C	C	P
Rush	<i>Juncus</i> sp.	S	4	A/P

¹C = control, S = suppression

²Maximum plant height in inches at time of application

³Growth habit: A=Annual, SA=Summer Annual, WA=Winter Annual, B=Biennial

P=Perennial

⁴Some species are tolerant and resistant biotypes are possible.

^{*}For annual control. The addition of 1-2 pints of 2,4-D will aid in burndown.

[†]For best control apply in the fall.

[‡]See "SPECIAL WEED CONTROL" section

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Agricultural Products

BASF

Agricultural Use Requirements

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

- Coveralls
- Waterproof gloves
- Shoes plus socks

Storage and Disposal

Do not contaminate water, food or feed by storage or disposal.

Storage: Store above 28°F or warm to 40°F and agitate before use.

Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Plastic Container Disposal: Do not reuse container. Triple rinse (or equivalent). Puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

Metal Container Disposal: Do not reuse container. Triple rinse (or equivalent). Puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Use directions in Dow AgroSciences supplemental labeling may modify directions or limitations in this labeling.

Do not contaminate irrigation ditches or water used for irrigation or domestic purposes.

Do not use in greenhouses.

Avoiding Injury to Non-target Plants

This product can affect susceptible broadleaf plants directly through foliar contact and indirectly by root uptake from soil in treated areas. Do not allow spray drift to come in contact with vegetables, flowers, tomatoes, potatoes, beans, lentils, peas, alfalfa, sunflowers, soybeans, safflower, or other desirable broadleaf crops or ornamental plants.

Unless otherwise specified on this label or supplemental labeling for Transline, do not apply this product to any broadleaf crop or ornamental planting or to areas where sensitive plants will be planted during the same growing season. (See following guidance on "Rotation to Broadleaf Crops".)

Rotation to Broadleaf Crops: Do not plant broadleaf crops in treated areas until an adequately sensitive bioassay shows that no detectable clopyralid is present in the soil.

Field Bioassay Instructions: In fields previously treated with this product, plant short test rows of the intended rotational crop across the original direction of application in a manner to sample field conditions such as soil texture, soil pH, drainage, and any other variable that could affect the seed bed of the new crop. Field bioassay at any time between harvest of the treated crop and the planting of the rotational crop. Observe the test crop for herbicidal activity, such as poor stand (effect on seed germination) chlorosis (yellowing), and necrosis (dead leaves or shoots), or stunting (reduced growth). If herbicidal symptoms do not occur, the test crop can be grown. If there is apparent herbicidal activity, wait one year before repeating bioassay or plant a crop tolerant to clopyralid such as barley, canola (rapeseed), grasses, field corn, oats, sugar beets, or wheat.

Chemigation: Do not apply this product through any type of irrigation system.

Grazing/Haying: There are no restrictions on grazing or hay harvest following application of Transline at labeled rates.

Do not transfer livestock from treated grazing areas to sensitive broadleaf crop areas without first allowing 7 days of grazing on an untreated pasture. Otherwise, urine may contain enough clopyralid to cause injury to sensitive broadleaf plants.

Residues in Plants or Manure: Do not use plant residues, including hay or straw from treated areas, or manure from animals that have grazed or consumed forage from treated areas for composting or mulching where susceptible plants may be grown the following season. Do not spread manure from animals that have grazed or consumed forage or hay from treated areas on land used for growing susceptible broadleaf crops. To promote herbicidal decomposition, plant residues should be evenly incorporated or burned. Breakdown of clopyralid in crop residues or manure is more rapid under warm, moist soil conditions and may be enhanced by supplemental irrigation.

General Information

Transline* herbicide is recommended for selective, postemergence control of broadleaf weeds in non-cropland areas including equipment pathways, industrial manufacturing and storage sites and rights-of-way such as along roadsides, electrical lines and railroads. Use on these sites may include application to grazed areas as well as establishment and maintenance of wildlife openings, wild parkland and wildlife management areas, and forest spot application adjacent to these sites. Transline is labeled for control of broadleaf weeds in cottonwood/poplar and eucalyptus tree plantations; and in rangeland and permanent grass pastures in certain western states.

Advisory: In California, the maximum application rate is 2/3 pint/acre per annual use season.

General Use Precautions

In Arizona: The state of Arizona has not approved Transline for use on plants grown for agricultural/commercial production; such as on designated grazing areas.

Advisory Statements

Avoid Spray Drift: Avoid spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible broadleaf plants during active growth or dormant periods. Use coarse sprays to minimize drift. A drift control or deposition agent suitable for agricultural use may be used with this product to aid in reducing spray drift. If used, follow all use recommendations and precautions on the product label.

Ground Application: To minimize spray drift, apply Transline in a total spray volume of 10 or more gallons per acre as large-droplet, low-pressure spray. Refer to spray equipment manufacturer's recommendations for additional information on spray volume, spray pressure, sprayer speed, type and arrangement of nozzles, height of nozzles above the target canopy, etc. Spray drift can be lessened by keeping the spray boom as low as possible; by using no more than 30 pounds per square inch (psi) spraying pressure with large droplet-producing nozzle tips, by using larger nozzle tips rather than increasing pressure to increase spray volume; and by spraying when wind velocity is low. Do not apply with hollow cone-type insecticide or other nozzles that produce a fine-droplet spray. Keep operating spray pressures at the lower end of the manufacturer's recommended pressure range for the specific nozzle type used. Low pressure nozzles are available from spray equipment manufacturers. Select nozzles and pressures that provide adequate plant coverage but minimize the production of fine spray particles.

Aerial Application: Drift can be lessened by using straight stream nozzles directed straight back; by using drift control systems or use of drift control additives; and by keeping spray pressures low enough to provide coarse spray droplets. Do not use a thickening agent with the Microfoil or Thru-Valve booms, or other systems that cannot accommodate thick sprays. Spray only when wind velocity is low (follow state regulations).

Avoid application by aircraft when an air temperature inversion exists. Such a condition is characterized by little or no wind and lower air temperature near the ground than at higher levels. The use of a smoke device on the aircraft or continuous smoke column at or near site of application will indicate air direction and velocity, and whether a temperature inversion is present, as indicated by horizontal layering of the smoke.

Sprayer Clean-Out

To avoid injury to desirable plants, equipment used to apply Transline herbicide should be thoroughly cleaned before reusing to apply any other chemicals.

1. Rinse and flush application equipment thoroughly after use at least three times with water. Dispose of rinse water in non-cropland area away from water supplies.
2. During the second rinse, add 1 qt of household ammonia for every 25 gallons of water. Circulate the solution through the entire system so that all internal surfaces are contacted (15-20 min.). Let the solution stand for several hours, preferably overnight.
3. Flush the solution out of the spray tank through the boom.
4. Rinse the system twice with clean water, recirculating and draining each time.
5. Nozzles and screens should be removed and cleaned separately.

Mixing Instructions

1. Add 3/4 of the required spray volume to the spray tank and start agitation.
2. Add the required amount of Transline.
3. Add any surfactants, adjuvants or drift control agents according to manufacturer's label.
4. Agitate during final filling of the spray tank and maintain sufficient agitation during application to ensure uniformity of the spray mixture.

Tank Mixing: This product may be applied in tank mix combination with labeled rates of other products provided (1) the tank mix product is labeled for the timing and method of application for the use site to be treated; and (2) tank mixing is not prohibited by the label of the tank mix product.

Tank Mixing Precautions:

- Read carefully and follow all applicable use directions, precautions, and limitations on the respective product labels.
- Do not exceed recommended application rates. Do not tank mix with another pesticide product that contains the same active ingredient as this product unless the label of either tank mix partner specifies the maximum dosages that may be used.
- For products packaged in water soluble packaging, do not tank mix with products containing boron or mix in equipment previously used to apply a product mixture containing boron unless the tank and spray equipment has been adequately cleaned. (See instructions for Sprayer Clean-Out.)
- Always perform a (jar) test to ensure the compatibility of products to be used in tank mixture.

Tank Mix Compatibility Testing: A jar test is recommended prior to tank mixing to ensure compatibility of Transline and other pesticides. Use a clear glass quart jar with lid and mix the tank mix ingredients in their relative proportions. Invert the jar containing the mixture several times and observe the mixture for approximately 1/2 hour. If the mixture balls-up, forms flakes, sludges, jels, oily films or layers, or other precipitates, it is not compatible and the tank mix combination should not be used.

Application

Timing: Apply to actively growing weeds. Extreme growing conditions such as drought or near freezing temperatures prior to, at, and following time of application may reduce weed control. **Only weeds that have emerged at the time of application will be affected.** Wet foliage at the time of application may decrease control. The treatment with Transline will be rainfast within 2 hours after application.

Application Rate Ranges: Generally, lower labeled application rates will be satisfactory for young, succulent growth of susceptible weed species. Higher labeled rates will generally be required for more tolerant species, perennials, weeds in dense stands or in advanced stages of growth, or under conditions of plant stress such as drought or extreme temperatures.

Spray Coverage: Use sufficient spray volume to provide thorough and uniform spray coverage of target weeds. Do not broadcast apply in less than 2 gallons of total spray volume per acre. For best results and to minimize spray drift, apply in a spray volume of 10 or more gallons per acre. In general, spray volume must be increased as crop canopy, height and weed density increase in order to obtain equivalent weed control. Use only nozzle types and spray equipment designed for herbicide application. To reduce spray drift, follow precautions under "Avoiding Injury to Non-target Plants" in "Advisory Statements" section of this label.

Use of Adjuvants: Addition of surfactants, crop oils, or other adjuvants may increase effectiveness of Transline herbicide. If an adjuvant is added to the spray solution, follow all manufacturer use guidelines.

Broadleaf Weeds Controlled

acacias	ladythumb†
artichoke, Jerusalem	lettuce, prickly
buckwheat, wild	locoweed, white
buffalobur†	locoweed, lambert
burdock, common	marshelder
chamomile, false (scentless)	mesquite
chamomile, mayweed (dogfennel)	nightshade, eastern black
clover, black medic	nightshade, cutleaf
clover, hop	nightshade, hairy
clover, red	oxeye daisy
clover, white	pineappleweed
cocklebur, common	ragweed, common
coffeeweed	ragweed, giant
cornflower (bachelor button)	salsify, meadow (goatsbeard)
dandelion	sicklepod
dock, curly	smartweed, green†
groundsel, common	sorrel, red
hawksbeard, narrowleaf	sowthistle, annual
hawkweed, orange	sowthistle, perennial†
hawkweed, yellow	starthistle, yellow
horseweed	sunflower (common and wild)
Jimsonweed	teasel, common
knapweed, diffuse	thistle, bull
knapweed, Russian†	thistle, Canada (rosette to bud)
knapweed, spotted	thistle, musk (rosette to bud)
kudzu	vetch

†These weeds may only be suppressed. Suppression is a visual reduction in weed competition (reduced population or vigor) as compared to untreated areas. The degree and duration of weed control will vary with weed size and density, application rate and coverage, and growing conditions before, during, and after the time of treatment. For perennial weeds such as Russian knapweed, and perennial sowthistle, Transline will control the initial top growth and inhibit regrowth during the season of application (season-long control). At higher use rates shown on this label, Transline may cause a reduction in shoot regrowth in the season following application; however, plant response may be inconsistent due to inherent variability in shoot regrowth from perennial root systems.

Non-Cropland Use (All States Except California)

Use Requirements for Non-cropland Areas: No Worker Protection Standard worker entry restrictions or worker notification requirements apply when this product is applied to non-cropland.

For use on non-cropland areas such as industrial manufacturing and storage sites and rights-of-way such as along roadsides, electrical power lines, communication lines, pipelines and railroads, including grazed areas on these sites and forest spot application adjacent to these sites.

Broadcast Application (Ground or Aerial)

For control of broadleaf weeds, apply 1/4 to 1 1/3 pints per acre of Transline (equivalent to 0.09 to 0.5 lb acid equivalent per acre). Non-ionic surfactant should be used in spray mixtures at 1 to 2 quarts per 100 gallons of spray mixture. The lower rate of 1/4 pint per acre provides acceptable control of weeds only under highly favorable plant growing conditions and when plants are no larger than 3 to 6 inches tall. Where Canada thistle or knapweed is the primary pest, best results are obtained by applying 2/3 to 1 1/3 pints per acre of Transline after basal leaves are produced. Transline can be applied in an invert emulsion using oil and an appropriate inverting agent. Follow label directions of the inverting agent. Established grasses are tolerant to Transline but new grass seedlings may be injured to varying degrees until the grass has become well established as indicated by vigorous growth and development of tillers and secondary roots.

High-Volume Leaf Stem Treatment (Ground Application)

For control of broadleaves and certain woody plants (e.g., mesquite), use 1 to 3 quarts of Transline per 100 gallons of total spray. Thorough coverage is necessary for good results, therefore, apply as a complete spray-to-wet foliar application, including all leaves, stems, and root collars but not to exceed a total application rate of more than 1 1/3 pints per acre of Transline. To minimize drift, use low spray pressure and keep sprays no higher than the tree crowns. Trees taller than 8 feet in height may be difficult to treat efficiently and obtain thorough coverage.

Unsatisfactory control may result if application is made when brush and weeds are under severe drought stress or other adverse conditions that inhibit plant growth. Environmental conditions may significantly influence results. For best results on mesquite, apply in the spring or early summer, 40 to 90 days after the first green growth appears and when soil moisture is adequate for active growth. A soil temperature of 75° to 83°F at a depth of 12 to 18 inches is optimal for good plant kills. Soil temperature of less than 75° F at this depth will reduce the ultimate root kill of mesquite.

Non-Cropland Use (California Only)

Use Requirements for Non-cropland Areas: No Worker Protection Standard worker entry restrictions or worker notification requirements apply when this product is applied to non-cropland, rangeland, and permanent grass pastures not harvested for hay.

For use on non-cropland areas such as industrial manufacturing and storage sites and rights-of-way such as along roadsides, electrical power lines, communication lines, pipelines and railroads, including grazed areas on these sites and forest spot application adjacent to these sites.

Weeds Controlled

knapweed, diffuse	starthistle, yellow
knapweed, Russian†	thistle, Canada (rosette to bud)
knapweed, spotted	thistle, musk (rosette to bud)

†These weeds may only be suppressed. Suppression is a visual reduction in weed competition (reduced population or vigor) as compared to untreated areas. The degree of weed control and duration of effect will vary with weed size and density, spray rate and coverage, and growing conditions before, during, and after the time of treatment.

Broadcast Application (Ground or Aerial)

For control of broadleaf weeds, apply 1/4 to 2/3 pint per acre of Transline (equivalent to 0.09 to 0.25 lb a.e. per acre). Non-ionic surfactant should be used in spray mixtures at 1 to 2 quarts per 100 gallons of spray mixture. The lower rate of 1/4 pint per acre provides acceptable control of weeds only under highly favorable plant growing conditions and when plants are no larger than 3 to 6 inches tall. Where Canada thistle or knapweeds are the primary pest, best results are obtained by applying 2/3 pint per acre of Transline after basal leaves are produced. Spray volumes of 20 gallons or more per acre for ground roadside and rights-of-way applications and spray volumes 5 gallons or more per acre or more for aerial applications will ensure adequate coverage. Transline can be applied in an invert emulsion using oil and an appropriate inverting agent. Follow label directions of the inverting agent. Established grasses are tolerant but new grass seedlings may be injured to varying degrees until the grass has become well established.

Broadleaf Weed Control in Rangeland and Permanent Grass Pastures

(For use in Western States, Including California, Colorado, Idaho, Montana, Nebraska, Nevada, Oregon, South Dakota, Utah, Washington and Wyoming)

Use Transline to control susceptible broadleaf weeds on rangeland areas or established forage grasses in permanent grass pastures. Best results on most weeds are obtained when weeds are small and actively growing (see specific information below) and application is made in 10 or more gallons per acre of water using ground equipment.

There are no grazing or haying restrictions following Transline applications when used at labeled rates.

Application Rates

Apply Transline at a rate of 1/3 to 1 1/3 pint per acre when weeds are young and actively growing. Transline may be applied as described below for control of spotted and diffuse knapweed, Canada thistle, musk thistle, yellow starthistle and suppression of Russian knapweed. Use the lower labeled application rate for young, actively growing weeds. The higher rate should be used under less favorable growing conditions, or on dense weed stands and/or larger weeds. Transline may also be tank mixed with 2,4-D at 1/2 to 1 lb acid equivalent per acre where weed species present are susceptible to 2,4-D.

Advisory: In California, the maximum application rate is 2/3 pint per acre per annual use season.

Weed Species	Rate per Acre	Application Timing
Spotted & Diffuse Knapweed	2/3 - 1 pint	Apply any time plants are actively growing, including fall regrowth. Optimum time is from mid bolt to late bud stage of growth.
Russian Knapweed (suppression)	1 - 1 1/3 pint	Apply from bud to mid-flower growth stage or treat fall regrowth.
Canada Thistle	2/3 - 1 1/3 pint	Apply after the majority of basal leaves have emerged through the beginning of the bud stage. Treatment may also be applied to fall regrowth.
Musk Thistle	1/3 - 1 pint ¹	Apply from rosette to early bolt growth stage.
Yellow Starthistle	1/2 - 1 pint	Apply from rosette to mid-bolt growth stage

¹Transline may be applied to musk thistle in the rosette stage at 1/3 pint per acre only when applied in tank mixture with 2,4-D at 1/2 to 1 lb acid equivalent per acre. Otherwise, apply Transline to musk thistle at 2/3 to 1 pint per acre.

Precautions:

- Some desirable broadleaf plants (forbs) are susceptible to Transline. Do not spray pastures containing desirable forbs, especially legumes, unless injury can be tolerated. However, the stand and growth of established perennial grasses is usually improved after treatment, especially if rainfall is adequate for active plant growth and grazing is deferred.
- Grasses are tolerant to Transline, but new grass seedlings may be injured to varying degrees until well established as evidenced by development of secondary roots and tillering (multiple stems).
- Do not use hay or straw from treated areas for composting or mulching on susceptible broadleaf crops.
- Rotation to Broadleaf Crops:** Do not plant broadleaf crops in treated areas until an adequately sensitive bioassay crop such as soybean or other legume shows that no detectable clopyralid is present in the soil.

Crop Use

Agricultural Use Requirements for Crop Uses: For use of this product in tree plantations, follow PPE and Reentry restrictions in the Agricultural Use Requirements section of this label.

Cottonwood/Poplar and Eucalyptus Tree Plantations

Transline may be used for selective postemergence control of labeled broadleaf weeds in new and established plantings of cottonwood/poplar and eucalyptus tree plantations. Apply as a broadcast foliar spray over trees or as a banded or directed spray at a rate of 1/3 to 2/3 pints/acre. Apply in 10 or more gallons per acre total spray volume using ground equipment only. Multiple applications may be made as long as the total rate per annual use season does not exceed 1 1/3 pints/acre. Apply to new plantings only after they are well-established as indicated by several inches of new healthy growth.

Advisory: In California, the maximum use rate is 2/3 pint per acre per annual use season.

Hand-Held Sprayers: Spot applications using hand held equipment are also allowed, but contact with tree foliage should be avoided or limited to lower branches. Apply to weeds on a spray-to-wet basis with spray coverage uniform and complete. Do not spray to the point of run-off. Prepare a spray solution by adding 1/4 fl oz Transline per gallon of water. When applied at 1 gallon of spray per 1000 sq ft, this spray concentration is equivalent to a broadcast rate of 2/3 pt/acre.

Use Precautions:

- Do not tank mix Transline with other herbicides labeled for this use unless spray avoids all contact with tree foliage.
- Transline will not control certain broadleaf weeds, including mustards, henbit, chickweed, kochia, lambsquarters, pigweed, Russian thistle and bindweed.

Warranty Disclaimer

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Inherent Risks of Use

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Revisions:

"Avoiding Injury to Non-target Plants" paragraph was formatted. Grapes were removed from aerial drift and moved to the "General Use Precautions" section.